



**SPEAK UP BROWARD**

Transportation Choices. Your Voice Counts.

# The Cost of Doing Nothing More

Economic and Real Estate Analysis for Sustainable Land Use Outcomes  
September 2014



broward **MPO**  
metropolitan planning organization

CONTENT PROVIDED BY:



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# Executive Summary

## Overview

**The Cost of Doing Nothing More** is an assessment of the benefits transportation, specifically transit, improvements can have on the economy and mobility of Broward County. The assessment is based on a review of national case studies and utilizes local projects as the basis for calculating and then expanding potential impacts throughout Broward. This process and the specific measures considered in the analysis are illustrated in Figure 1. Figure 2 identifies the geographies examined.

The specific local projects utilized for this analysis are:

**The Wave Streetcar** that is currently in design and planned for construction in downtown Fort Lauderdale in the next few years.

**The Central Broward East-West Transit Study** that provides connectivity from downtown Fort Lauderdale to the Fort Lauderdale-Hollywood International Airport, the Tri-Rail stations located at Broward Boulevard and Griffin Road, and along Griffin Road to portions of Dania Beach and Davie, terminating at the South Florida Education Center (SFEC).

Throughout this document the Central Broward East-West Transit Study may be referred to as the CBT Route or by different potential implementation segments such as Airport Segment, CBT Route to Davie Road, and the SFEC Loop.

**FIGURE 1: Methodology Overview**

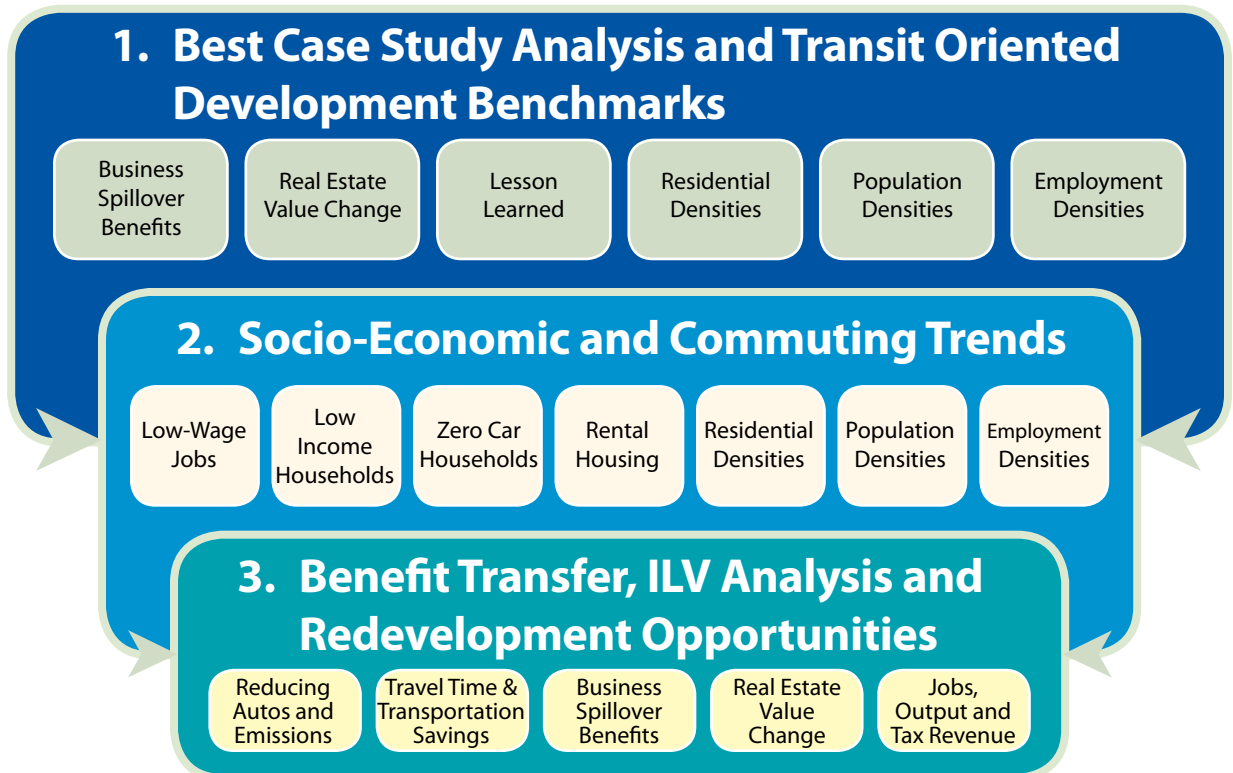


FIGURE 2: Geographies Examined



# Broward Takeaways

## Accessible and Affordable Transit is an Economic Development Issue

According to the **U.S. Federal Highway Administration** (FHWA), transportation costs are a household's second largest outlay after housing related costs. Further, in auto-dependent areas of the country (think suburban sprawl areas) with few transit options, the cost of automobile ownership and maintenance can quickly crowd out expenditures on necessities and leisure items – groceries, clothing, outings to the movies or amusement park, dining out, etc.

Communities having few public transit options – particularly those having large numbers of low- and moderate-income households – are at risk of undermining the health and expansion of their business districts. For example, the FHWA estimates that a household living in an area absent transit options is likely to spend as much as 25 percent of their household income on automobile ownership and maintenance, as opposed to approximately nine percent of household income for those who live near transit or in walking distance to employment and shopping services.

What is of particular concern is that much of the projected employment growth around the nation and in the Broward County region, in particular, will be concentrated in lower-wage industries such as food and beverage services, retail, hospitality/lodging and certain healthcare fields. Many of the workers in these lower-wage industries – mostly hourly workers and a large percentage of whom are part-time employees – struggle to both pay for quality housing near where they work and dependable transportation, given scant transit options.

Maintaining a high quality of life and low cost of living is necessary in attracting and retaining workers and businesses. Transit and transit-oriented development can improve Broward's regional competitiveness by making it a better and more affordable place to live and work. By introducing fixed guideway transit options – such as streetcar and Bus Rapid Transit – Broward is taking a formidable step towards achieving long-term economic viability for its business community.

# Key Findings

## Benefit Transfer Analysis

- **Every one-percent reduction in automobile usage within Broward County would remove 87,300 cars from the road per day and eliminate over 7,400 tons of CO2 per year.** Looking specifically at the carbon dioxide emissions created from transit and automobile operations, the Wave Streetcar route produces 4,256 less tons per year than continued status quo automobile usage, and 3,344 less tons of CO2 per year if the Wave Streetcar is extended. Additional carbon emissions would likely be avoided from persons choosing to commute via transit rather than automobile, as a result of improved transit service.
- **With the true cost of driving totaling around \$8,000 a year to own a car not including the cost of gas, the potential cost saving per household of becoming less car dependent is significant across all households - especially single-earner households earning less than a living wage.** Even if a two-adult Broward County household switched from owning two to one cars, this household could potentially save \$595 per month (equivalent to \$7,139 per year).
- **Compared to automobile use (status quo), the Wave Streetcar route would result in an annual total travel time cost savings of nearly \$2.6 million, compared to \$352,080 for regular bus service and \$3.4 million for BRT.** Further, the relationship between travel time cost savings would be greater under the proposed CBT Route, as the number of daily trips and miles traveled would increase with improved transit service.

## Potential Benefits

- Carbon Emissions Avoided
- Alternatives to Auto Travel
- Travel Time Value



Artist rendering of the Wave Streetcar



# Key Findings *(continued)*

## Benefit Transfer Analysis

- As a result, the Wave Streetcar (and additional streetcar lines) is likely to result in significant time value savings for Broward County residents and workers. With the average travel time to work just over 27 minutes within Broward County, **a five to ten percent reduction in average travel time for each work trip could result in between \$88.1 to \$176 million dollars in annual travel-time savings for Broward County commuters.**
- Business spillover effects are twofold. First, a percentage of the money collectively saved (approximately four-percent) from reduced congestion is (mostly) fed back into the local business economy. Second, is the growth in sales for businesses located within 1,000 feet of the Wave streetcar route- also known as “proximity benefits.” **Assuming ideal conditions, the Central Broward East-West Transit route would result in a \$78 million dollar increase in spending for businesses located within 1,000 feet of the track\*.**
- **On average, the Wave Streetcar and Central Broward East-West Transit route are estimated to increase surrounding real estate values by nearly \$7,000 per property (average increase of eight percent).** Some of this transit premium may be captured through a Transit Oriented Development (TOD) TIF District, which could help pay for capital improvements near potential bus stops or rail stations, and determine community benefits (e.g. affordable housing, local job requirements, etc.) that would prevent displacement of existing residents and businesses.

### Potential Benefits

- Transportation Cost Savings
- Business Spillover Benefits
- Real Estate Value Change

*\*Most economic benefits and effects associated with transit are experienced within ¼ mile of stations. For the purposes of this document the study area used was 1,000 feet from the potential tracks since final station areas have not been determined and the information provided in this report may help to establish the best station locations moving forward.*



TECO Line - Tampa, Florida

# Key Findings *(continued)*

## Benefit Transfer Analysis

- Projected investment approximately \$140 million to construct the Wave Streetcar is estimated to result in over 1,400 total jobs, nearly \$220 million in total economic output, and just under \$5.8 million in state and local taxes by mid-2016. **Every \$1 million investment in transit and ground passenger transportation in Broward County is estimated to result in 21 total jobs, over \$1.4 million in total economic output, and \$62,100 in state and local taxes.** Bus Rapid Transit (BRT) exhibits a similar employment multiplier to streetcar and can be implemented at a much lower capital cost.
- **More than half of the 1,931 acres of commercial, industrial, and mixed use property, with boundaries that fall within a ¼ mile radius of the CBT Route have low improvement-to-land value (ILV) ratios.** Approximately 713 acres of this land is located within a quarter-mile of the South Florida Education Center Loop. Areas with concentrations of large contiguous vacant and/or underutilized land with low ILV ratios provide opportunities to attract private industry employers, while small commercial infill parcels may require additional incentives (e.g. density bonuses, parking reductions, etc.) to stimulate TOD redevelopment.

## Potential Benefits

- Economic Impacts  
(Employment, Taxes, Output)



**Nova University Southeastern University part of the South Florida Education Center**

# Key Findings *(continued)*

## Best Case Studies and Benchmarks

- **In cities with comparable investments, the areas surrounding transit stops exhibited measurable increases in residential and retail real estate values.** Even after streetcar projects were completed, they provided new employment opportunities through establishments built along the route. However, streetcars that do not connect to other forms of transit are often relegated to “tourist transportation,” with minimal attendant Transit Oriented Development activity. Fort Lauderdale can learn from the experience of other comparable cities like Memphis which extended its streetcar system to better serve the needs of its residents, rather than just tourists.
- **Several Broward communities meet minimum employment densities for TOD but fall below minimum residential and population densities recommended for even suburban express bus service.** Based on Transit Oriented Development (TOD) Design Guidelines developed by the Florida Department of Transportation (FDOT), Broward communities should encourage increased residential and population densities (e.g., apartment construction and affordable housing) along new or expanded transit investment routes to better support transit ridership, and entice transit-oriented development, exemplified by that of Memphis and Seattle. To offset the rising costs of living in an area that gentrifies as a result of a transit investment, cities, counties and states should support the development of affordable housing near transit through a range of tax credits and abatements, direct monetary incentives, and policy requirements.

### Best Case Study Analysis

- Little Rock, Arkansas: **RiverRail**
- Memphis, Tennessee: **MATA**
- Tampa, Florida: **TECO Line**

### TOD Benchmarks

- Residential densities
- Population Densities
- Employment Densities



RiverRail - Little Rock, Arkansas



MATA Transit Service - Memphis, Tennessee

# Key Findings *(continued)*

## Socio-Economic and Commuting Trends

- **Transit investment could considerably increase the mobility options of nearly 1,300 zero-car households within a ¼ mile radius of the Wave Streetcar route and over 2,600 zero-car households within a ¼ mile of the potential Central Broward East-West Transit route.** Based on both empirical observations and secondary research, zero-car and low-income households are predisposed to use public transit.
- Ninety-percent of Broward County area workers commute by automobile, as low-density employment centers and suburban residential neighborhoods are scattered throughout the county. Coordinating future transit and land use investment is critical for creating a more sustainable and accessible Broward County. **The potential Central Broward East-West Transit route could serve more households, including a larger share of lower-wage workers employed at the airport, retail centers and the South Florida Education Center (SFEC).**
- **Compared to Fort Lauderdale, other Broward County communities such as Miramar, Plantation, Hollywood, Sunrise have, on average, higher shares of traditionally lower-wage employment (e.g. retail, food service, etc.) and households earning less than \$35K per year, but lower shares of zero-car households and rental housing.** As a result, workers employed within these areas would likely benefit from increased residential development, as it would provide more options for them to live closer to their jobs, and mobility options, and subsequent transportation savings incurred by improved transit service.

### Socio-Economic and Commuting Trends

- Low-Wage Jobs
- Low-Income Households
- Zero-car households
- Rental housing

### Scenarios

- Wave Streetcar route
- CBT Route
- Broward County
  - Selected Communities
  - Study Areas



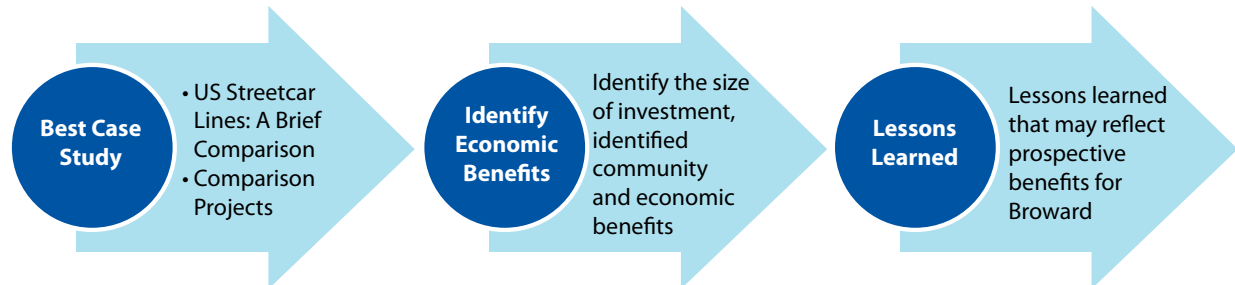
Fort Lauderdale community

# Best Case Study Analysis

## Methodology

A literature review pertaining to similar economic analysis done to assess economic impacts associated with large-scale public transportation improvements in other communities that focus on increased service, upgraded and/or expanded infrastructure, newly served employment districts or connections to other transit modes was conducted. Comparable case studies were selected based on city size, density, wealth, and distribution; or similarly sized projects (in terms of the Wave's 2.7 mile run, or the proposed Central Broward East-West Transit route to the airport and South Florida Education Center). Studies were sought that define economic development outcomes for investments made since 2000.

Good examples of how other locations dealt with issues of gentrification were identified for future consideration in addressing and planning for **Federal Transit Administration New Starts** criteria, concerning affordable housing. Our objective is to identify the size of investment, identified community and economic benefits attributable to said investments (e.g., direct and indirect jobs, new businesses established, increase in real property and other tax revenues, improved air quality, reduced commutation costs, and alleviation of auto congestion). This best case study review includes findings concerning lessons learned that may reflect prospective benefits for Broward.



### **\$137 dollars in local economy: \$1 capital invested**

For every \$1 invested to build Little Rock's RiverRail, another \$137 dollars in private investment was leveraged through development of new businesses and new residences.

### **13,000 new employees**

The number of new permanent employees hired, as a result of the RiverRail streetcar, associated with new retail and offices set up along the route.

### **Retail: 44 to 70 percent increase**

In Little Rock, Arkansas, retail real estate values increased by 44 percent in the areas nearest to RiverRail station stops. In Memphis, Tennessee, unused retail spaces located a ¼ mile from a streetcar stop realized a 70 percent increase in value, over similar establishments outside the streetcar radius.

### **Residential: 25 to 700 percent increase**

In Memphis, Tennessee, residential real estate prices rose an average of 25 percent from 2002 to 2010, and over 700 percent in areas within 0.25 miles (in walking distance) from a station stop.

# Brief Comparison

## Notable U.S. Streetcars

Location	Total Streetcar Mileage	Year Established Opened for Service	Number of Stations	City Population Density	City Size (waterways Included)	Major Transportation Connections (e.g. train stations, and water ports)	Headways, minutes (time in between arrivals)	Current annual ridership (rounded 2013)	Regular Operation (frequent, year-round service)
Fort Lauderdale, Florida	N/A	N/A	10	4,761 sq. mi.	38.6 sq. mi.	None in Initial Plan	Not In Operation	N/A	N/A
Astoria, Oregon	3.0	1999	18	1,539 sq. mi.	10.1 sq. mi.	Commuter Rail Waterport	Irregular	40,000	No
Charlotte, North Carolina	2.2	1996	11	2,457 sq. mi.	297.7 sq. mi.	LYNX Blue Line	30	N/A: Special Occasions	No
Dallas, Texas (M-Line)	4.2	1989	12	3,645 sq. mi.	385.8 sq. mi.	Rapid Transit	15	N/A: Part of DART Transit	No
Galveston, Texas	3.7	1996	22	1,240 sq. mi.	208.3 sq. mi.	None	Not in Operation	N/A: Out of Operation	No
Kenosha, Wisconsin	1.7	2000	19	3,684 sq. mi.	27.0 sq. mi.	None	15	63,000	No
Little Rock, Arkansas	3.0	2004	13	1,682 sq. mi.	116.8 sq. mi.	None	25	124,100	Yes
Lowell, Massachusetts	1.0	1984	5	7,500 sq. mi.	14.5 sq. mi.	None	Irregular	80,000	No
Memphis, Tennessee	7.0	1993	34	2,127 sq. mi.	324.0 sq. mi.	Amtrak, MATA Bus, Riverfront	10	1,340,000	Yes
Portland, Oregon	8.0	2001	46	2,127 sq. mi.	145.1 sq. mi.	Bus Lines, Waterway	12	4,100,000	Yes
San Pedro, California	1.5	2003	4	4,375 sq. mi.	38.6 sq. mi.	Shuttle Bus, Waterport	20	100,000	No
Savannah, Georgia	1.0	2009	7	1,321 sq. mi.	108.7 sq. mi.	Bus, Ferry	15	75,000	No
Seattle, Washington	1.3	2007	6	7,402 sq. mi.	142.5 sq. mi.	Monorail, Light Rail	15	750,300	Yes
Tacoma, Washington	1.6	2002	5	3,990 sq. mi.	62.3 sq. mi.	Commuter Rail Bus, Light Rail	15	1,000,000	Yes
Tampa, Florida	2.4	2003	10	2,969 sq. mi.	170.6 sq. mi.	Amtrak	15	441,000	No

SOURCE: Transit Cooperative Research Program #86, Federal Transit Association, US Census

# Brief Comparison

## Tourist Streetcars

Location	Total Streetcar Mileage	Year Established Opened for Service	Number of Stations	City Population Density	City Size (waterways Included)	Major Transportation Connections (e.g. train stations, and water ports)	Headways, minutes (time in between arrivals)	Current annual ridership (rounded 2013)	Regular Operation (frequent, year-round service)
Astoria, Oregon	3.0	1999	18	1,539 sq. mi.	10.1 sq. mi.	Commuter Rail Waterport	Irregular	40,000	No
Charlotte, North Carolina*	2.2	1996	11	2,457 sq. mi.	297.7 sq. mi.	LYNX Blue Line	30	N/A: Special Occasions	No
Dallas, Texas (M-Line)	4.2	1989	12	3,645 sq. mi.	385.8 sq. mi.	Rapid Transit	15	N/A: Part of DART Transit	No
Galveston, Texas (suspended due to hurricane)	3.7	1996	22	1,240 sq. mi.	208.3 sq. mi.	None	Not in Operation	N/A: Out of Operation	No
Kenosha, Wisconsin	1.7	2000	19	3,684 sq. mi.	27.0 sq. mi.	None	15	63,000	No
Lowell, Massachusetts	1.0	1984	5	7,500 sq. mi.	14.5 sq. mi.	None	Irregular	80,000	No
San Pedro, California	1.5	2003	4	4,375 sq. mi.	38.6 sq. mi.	Shuttle Bus, Waterport	20	100,000	Yes
Savannah, Georgia	1.0	2009	7	1,321 sq. mi.	108.7 sq. mi.	Bus, Ferry	15	75,000	No

**Tourist Streetcars** are those having a primary purpose for serving tourism, and sharing the following characteristics:

- Ridership is lower on these streetcar systems, and service is seasonal or limited.
- Cars do not make stops at as many transportation hubs as commuter streetcars.
- Cars tend to stick to historic districts or ride over historic right of way.
- TOD still exists in these areas, but it is not as prevalent because these lines do not connect as many business and residential districts with each other or with other forms of transit.

\*Charlotte's streetcar has been replaced by a higher-speed light rail system; the streetcar now only operates on holidays

SOURCE: Transit Cooperative Research Program #86, Federal Transit Association, US Census

# Brief Comparison

## Commuter Streetcars

Location	Total Streetcar Mileage	Year Established Opened for Service	Number of Stations	City Population Density	City Size (waterways Included)	Major Transportation Connections (e.g. train stations, and water ports)	Headways, minutes (time in between arrivals)	Current annual ridership (rounded 2013)	Regular Operation (frequent, year-round service)
Little Rock, Arkansas	3.0	2004	13	1,682 sq. mi.	116.8 sq. mi.	None	25	124,100	Yes
Memphis, Tennessee	7.0	1993	34	2,127 sq. mi.	324.0 sq. mi.	Amtrak, MATA Bus, Riverfront	10	1,340,000	Yes
Portland, Oregon	8.0	2001	46	2,127 sq. mi.	145.1 sq. mi.	Bus Lines, Waterway	12	4,100,000	Yes
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Tacoma, Washington	1.6	2002	5	3,990 sq. mi.	62.3 sq. mi.	Commuter Rail	15	1,000,000	Yes
Tampa, Florida*	2.4	2003	10	2,969 sq. mi.	170.6 sq. mi.	Bus, Light Rail, Amtrak	15	441,000	Yes

**Commuter Streetcars** are those that serve as a standard transit option, with easy access to other forms of transit servicing residential and commercial zones, and having fairly regular schedules. Additional characteristics include the following:

- Ridership is high, with short headways and frequent service.
- Almost all commuter cars connect to other (and multiple) forms of mass transit. Little Rock's streetcar connects the two halves of the city, which are separated by a river.
- Car routes service many different areas, including residential and commercial zones.
- TOD was an important factor in many of these train's lines, with a focus on revitalizing areas (e.g., Memphis, Portland) or connecting people with places of employment (e.g., Seattle, Tacoma).

\*Tampa's streetcar was originally created as a tourist streetcar, but is expanding into the downtown business district

SOURCE: Transit Cooperative Research Program #86, Federal Transit Association, US Census



# Comparison Projects

All the streetcar systems classified as tourist systems are poor case studies for the Wave Streetcar alignment (with full expansions), due to their limited operation schedules and lack of connections to other forms of transit. Further, these systems are used by tourists or for special occasions, and do not have the same level of TOD activity as the commuter systems.

## Why Not Seattle or Portland?

Even within the commuter systems, not all streetcars are good case studies for Fort Lauderdale. While Portland and Seattle are successful systems that offer valuable examples for other streetcar operations, they are not good case studies for Fort Lauderdale:

- **Portland:** Portland's streetcar system is not relevant to the Wave because of its size. The Portland streetcar stretches over 40 stops throughout the city and attracts, on average, over 10,000 daily riders.
- **Seattle:** Seattle's current streetcar loop runs about 1.5 miles, a size comparable to the initial Wave Streetcar. However, the Seattle streetcars began operation in 2007, making the long-term effects more difficult to measure, just yet. Seattle's previous streetcar system was torn down in 2005 to build the Olympic Park, and thus, is also a poor choice for study as it is no longer in use.

The RiverRail in Little Rock, the MATA streetcar line in Memphis, and the Tampa Bay TECO Streetcar were chosen instead.

- **RiverRail:** Relevant due to its length of track and scope, as well as its recent completion.
- **MATA:** Began as a two-mile downtown trolley line only, and has since expanded to seven miles of track, including connections to other forms of mass transit, similar to the proposed Wave expansions.
- **Tampa:** Although its streetcar has half the ridership of Seattle's, despite being twice the size and four years older, it has been successful in enabling TOD along the alignment, particularly the conversion of empty commercial buildings into successful residencies.



# Comparison Projects

## Little Rock, Arkansas: RiverRail

- A RiverRail began in 2004, as a 2.5-mile streetcar running through downtown Little Rock and connecting two halves of the river, then expanded in 2010, to its current size of 3.7 miles of track.
- Exceeding expectations, ridership averaged 15,000 to 20,000 per month, but has declined slightly in recent years.
- Over \$80 million in development along the line was announced upon its creation, and high-end executive housing and a \$28 million dollar ballpark has been recently built, illustrating continuing community engagement with the transit option ten years after its inception.
- Along the corridor to date is 957 new residential units, \$816 million in capital investment, and over five million annual visitors. Over 13,000 new employees have been hired permanently through new retail and business enterprises set up along the route.
- For every \$1 invested by local residents to build the rail line, another \$137 dollars in capital investment was created through businesses and new residences.
- Compared to those outside the area of effect, there is a 44 percent increase in retail real estate values, and 56 percent increase in residential real estate values within areas around the RiverRail.



SOURCE: Missoula Urban Transportation District | Urban Streetcar Study

SOURCE: Central Arkansas Transit Authority

# Comparison Projects

## Memphis, Tennessee: MATA

- MATA's goals were revitalization of underused urban space, including a deteriorating pedestrian mall, as well as providing job opportunities for residents and easy access to other forms of transit by linking major hubs.
- MATA succeeded in reinvigorating older infrastructure, by rebuilding Memphis's key transit hub - Central Station; and adding 63 apartments, a conference hall, police station, and 12,000 square feet of retail space.
- In addition to rebuilding older spaces, the streetcar led to a housing boom within walking distance of stops. Residential real estate prices rose an average of 25 percent from 2002 to 2010, and over 700 percent in areas within 0.25 miles (in walking distance) from a station stop. While not all of this increase may be attributable to the streetcar, its effect is notable.
- While existing retail did not see such dramatic increases, unused retail spaces 0.25 miles from the streetcar saw a 70 percent increase in value over similar unused retail space not easily accessed by the line.
- The first downtown route saw an annual ridership of 500,000, which has now swelled to over one million passengers since the completion of the full three-track, seven-mile run.
- The estimated impact of new development since 1991 has exceeded \$3 billion, with projects varying from residential developments, the University of Tennessee Medical Center and College of Pharmacy, and the Beale Street Landing.



SOURCE: Transit Cooperative Research Program #86, Federal Transit Association

# Comparison Projects

## Tampa, Florida: TECO Line

- TECO is unique among these case studies, as its original intent was a tourist streetcar. Its main stops included the various downtown locations Times Forum, University of South Florida, and Ybor City, but not the downtown business district. In 2011, the TECO line extended to downtown Tampa, connecting the streetcar to the business district and other means of mass transit.
- Once the streetcar connected to downtown, the effect was similar those cities that began by building their downtown lines first - residential demand increased with expanded transit options, and residents along the lines were more likely to use the streetcar instead of their own vehicles because of a reduced fare program.
- The Channelside area saw an additional 3,700 residential units built.
- Tampa's streetcar has almost half a million annual riders, and provides cruise ship passengers easy access to Ybor City and other tourism districts without renting cars and congesting local roads.
- Since the downtown expansion was only completed in 2011, direct economic impact is still unclear. However, along the original route, residential property values rose over 600% from 2002-2008, and many abandoned industrial zones were converted into now-used residential tracts.



SOURCE: Missoula Urban Transportation District | Urban Streetcar Study

SOURCE: Providence Core Connector Study: Streetcar Economic Impact Analysis

# Takeaway

## Best Case Study Analysis

- Streetcars provide more than a means of transit - they also revitalize the communities that surround them.
- Streetcar stops show a measurable improvement in all residential real estate values, and an improvement in empty lots zoned for retail and business.
- Even after streetcar projects are complete, they provide new employment opportunities through establishments built along the route.
- Streetcars that do not connect to other forms of transit, however, almost always end up being tourist lines, with minimal TOD and less daily usefulness. Streetcars need to connect to other forms of transit to remain useful to the entire community in the long term.
- Memphis streetcar ridership more than doubled from its initial route through the city to its expansion to important points of interest, including transit hubs.



# Takeaway

## Gentrification and Streetcars

Streetcars, like any other major revitalization project, can result in gentrification if real estate prices rise to the point where higher income households displace lower-income residents of a neighborhood who can no longer afford to remain in the area. When residential land values rise by 600 percent, even the increased number of apartments and residencies created along the line may be insufficient to offset the rising costs of living in the area. As a result, city, counties and states have supported the development of affordable housing near transit through a range of tax credits and abatements, direct monetary incentives, and policy requirements.

### **Tax Credits, Tax Abatement, and Monetary Incentives:**

- **Low Income Housing Tax Credits:** 28 states require that affordable transit like streetcars be accessible to receive tax credits for affordable housing units, spurring TOD.
- **Tax Abatement:** Portland offers 10 year tax abatement to developers building affordable housing units, including those built around the Portland Streetcar system.
- **TOD Benchmark Incentives:** Within the San Francisco Bay area, jurisdictions receive funding if TOD benchmarks are met, at \$1,000 per bedroom developed at a density of 25 units per acre, \$1,500 a bedroom at 40 units per acre, and \$2,000 a bedroom at 60 units per acre. Projects must be within one-third of a mile of a transit stop that has a wait of no more than 15 minutes at rush hour, with an additional \$500 per bedroom for affordable units.

### **Housing Requirements:**

**Lower Housing Requirements for Affordable Units:** The Bay Area, in addition to monetary benefits for housing near public transit, requires minimum levels of housing near transit stops. The required number of units to be built is lowered if the units are affordable housing units.

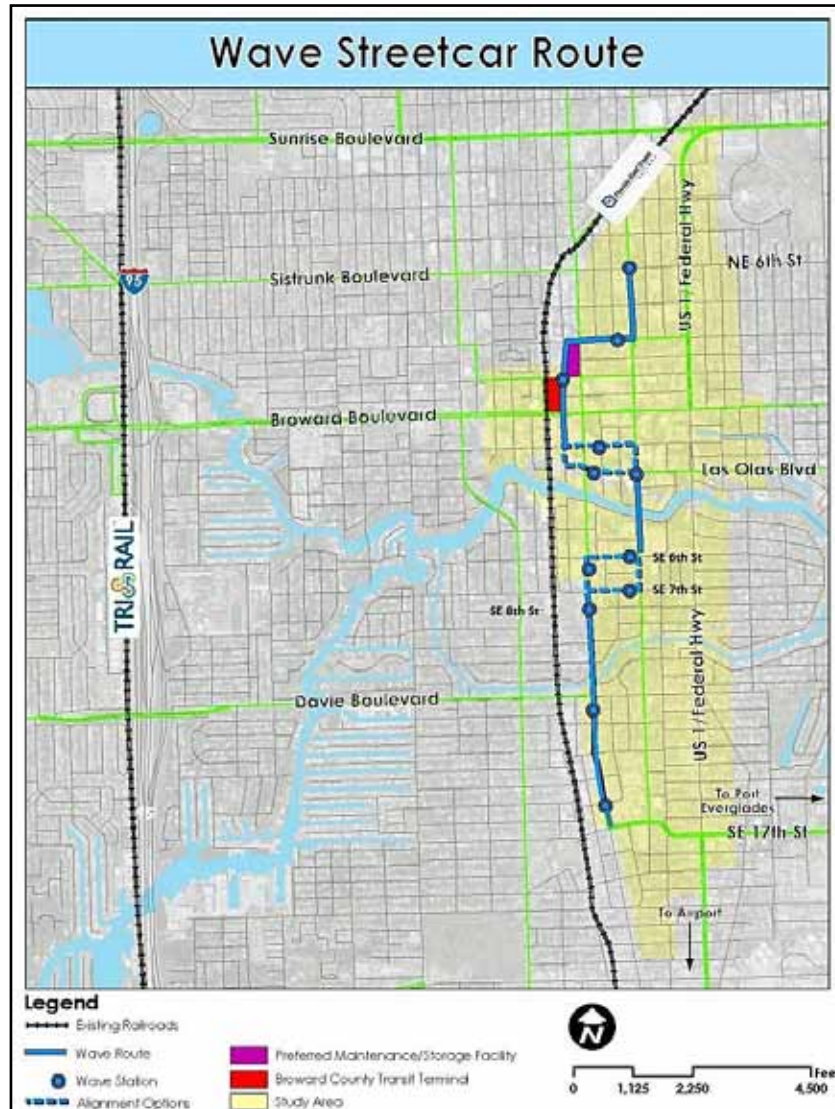
SOURCE: Policy Link

# Wave Streetcar and Central Broward East-West Transit Route

## Background: Wave Streetcar Route

Fort Lauderdale's population exceeds 150,000; its annual tourism rate is over 10 million. The proposed Wave Streetcar route would provide residents and tourists a convenient way to get around downtown without use of a personal vehicle, with connections to TriRail and other forms of mass transit via bus.

The findings in this report will help the Broward Metropolitan Planning Organization (Broward MPO) evaluate the prospective costs and benefits of the proposed Wave Streetcar and potential CBT route. It will also discuss potential benefit transfer implications for other communities within Broward County, including Miramar, Plantation, Hollywood, and Sunrise.

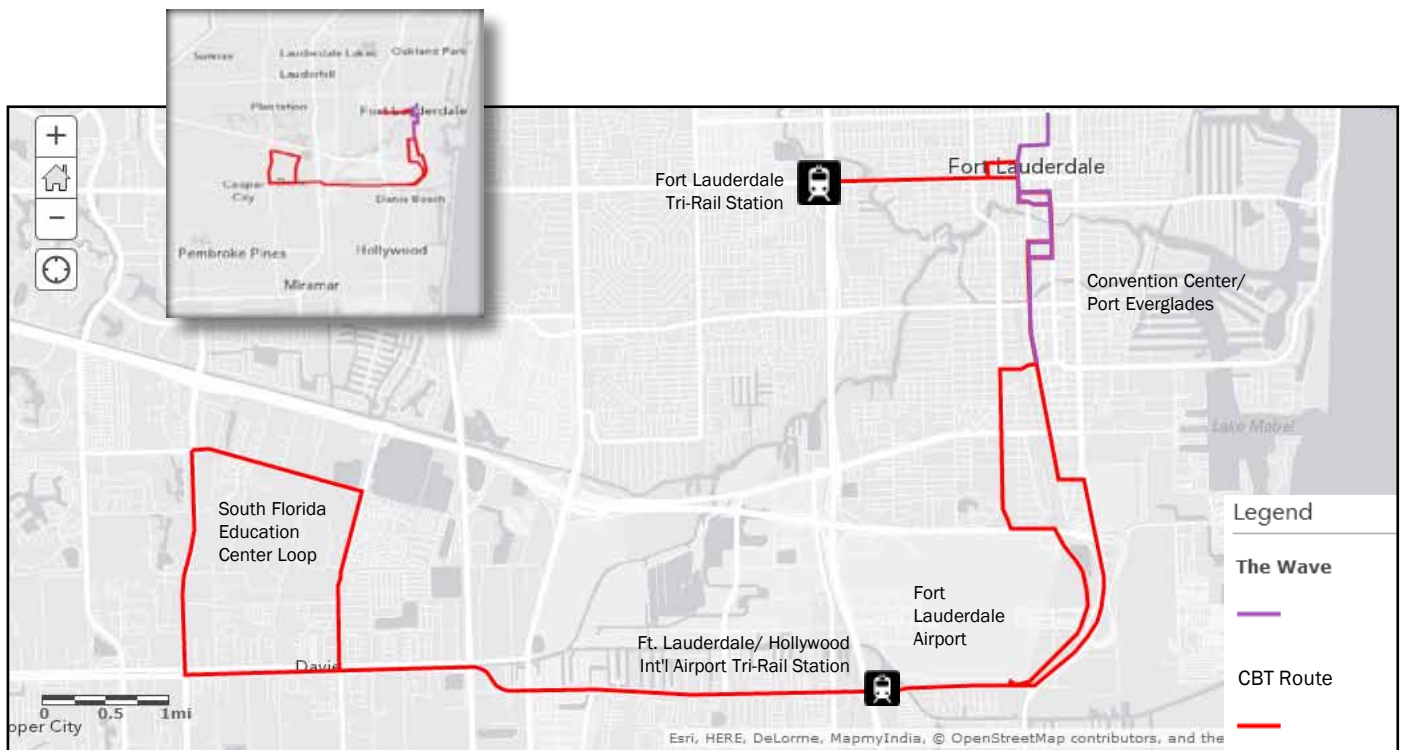


SOURCE: Sunny.org, the official site of Fort Lauderdale

# Background

## Wave Streetcar and Central Broward East-West Transit Route

The following map illustrates the Wave Streetcar and Central Broward East-West Transit routes.

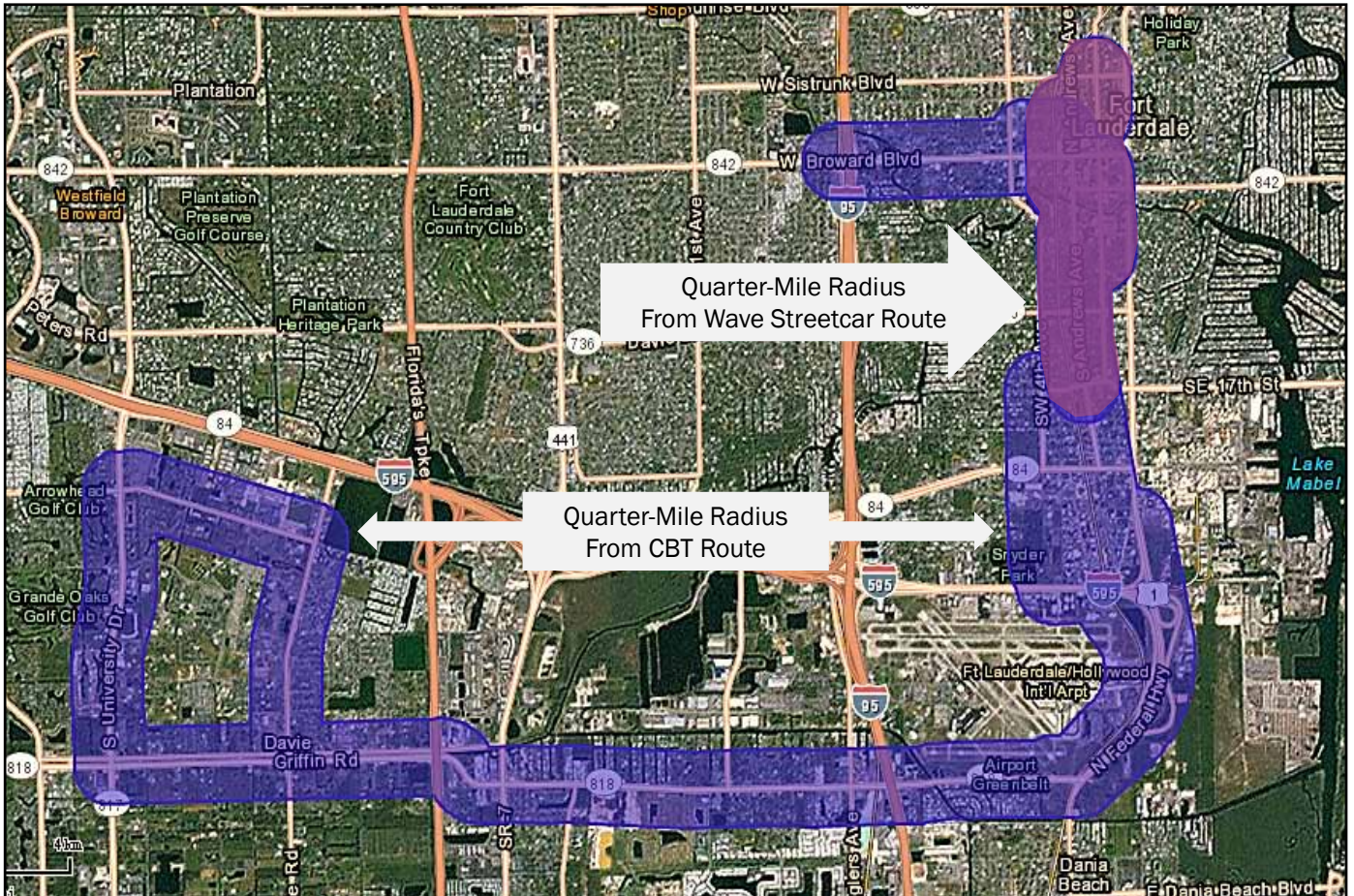




# Quarter-Mile Radius

## Wave Streetcar and Central Broward East-West Transit Route

The following map illustrates the area within one quarter-mile of the Wave Streetcar and Central Broward East-West Transit routes.



# Glossary of Terms

**Household Population:** Household population, as compared to total population, excludes persons living in dormitories, penal facilities, hospitals, and other institutional settings.

**Family:** A family is a group of two or more people (one of whom is the householder) related by birth, marriage, or adoption and residing together; all such people are considered as members of one family. The number of families is equal to the number of family households; however, the count of family members differs from the count of family household members because family household members include any non-relatives living in the household.

**Non-Family:** A non-family household consists of a householder living alone (a one-person household) or where the householder shares the home exclusively with people to whom he/she is not related.

**Household:** A household consists of all the people who occupy a housing unit. A house, an apartment, or other group of rooms, or a single room, is regarded as a housing unit when it is occupied or intended for occupancy as separate living quarters. The count of households excludes group quarters and institutions.

**Empty Nester Household:** A household in which one or more parents live after the children have left home, typically represented by ages 55-74.

**Metropolitan Statistical Area (MSA):** Metropolitan Statistical Areas (metro areas) are geographic entities defined by the Office of Management and Budget. A metro area contains a core urban area of 50,000 or more population. Each metro or micro area consists of one or more counties and includes the counties containing the core urban area, as well as any adjacent counties that have a high degree of social and economic integration (as measured by commuting to work) with the urban core.

**Flat Growth:** Flat growth is defined as an annualized rate of change between -0.75 and 0.75 percent.

SOURCE: U.S. Census Bureau

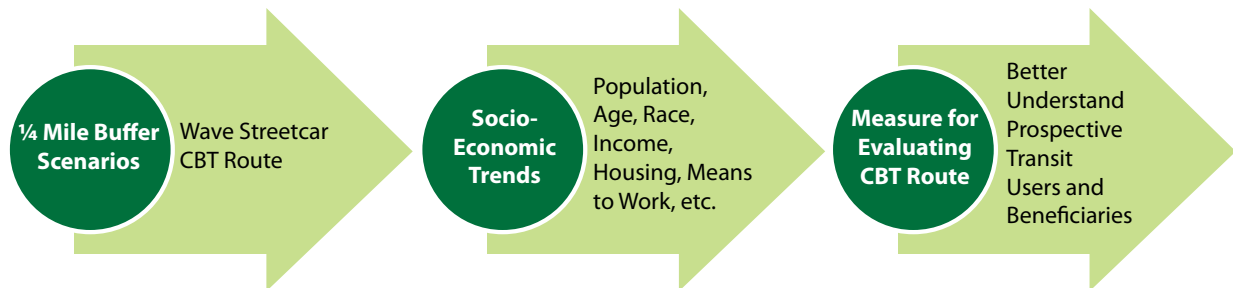
# Socio-Economic Trends

## Methodology

Socio-economic trends for a quarter-mile radius surrounding the Wave Streetcar route and the potential CBT Route were examined.

The analysis and recommendations that follow are based on a combination of quantitative and qualitative techniques. Quantitative analysis is underpinned by a combination of public and proprietary data sources, including U.S. Census-based data and Esri's Community Analyst software — a socio-economic data analysis tool.

Mapping techniques utilized natural breaks to determine the separation of classifications. While this classification system may result in number gradients that seem random, this method allows for the minimizing of variance within each classification and the maximization of variance between them.



# Socio-Economic Trends

## Key Findings: Analysis

### **Modest population growth**

According to data provided by ESRI, areas close to the Wave Streetcar route and the CBT Route are forecasted to experience population growth of approximately one percent annually through 2018.<sup>1</sup> It is possible that the implementation of the Wave may accelerate the rate of growth, as other streetcar investments have done in other locations such as Portland.

### **Strong growth in older population**

Consistent with national and regional trends, both study areas have experienced steady growth in baby boomers and empty nesters (those 55 and older). These demographic groups have demonstrated a growing propensity to utilize public transit.

### **Over 2,600 and 1,300 households, respectively**

Within the quarter-mile radius of the existing Wave Line and the potential CBT routes, there are over 2,600 households with annual incomes of less than \$25,000 and over 1,300 households without access to an automobile – groups which should benefit from the implementation of the Wave.

### **More renter-occupancy bodes well for the Wave Streetcar**

The Wave Streetcar route, along with the CBT route, are characterized by a higher percentage of rental units, relative to owner-occupied units, at rates of over 70 percent and 55 percent for the Wave and the CBT routes, respectively. A 2008 survey found that public transportation riders are overwhelming renters, outnumbering home-owners by a rate of two to one.<sup>1</sup>

<sup>1</sup>Public Research Institute, "2008/2009 On-Board Rider Survey—System-wide Results." 2010.

# Socio-Economic Trends

## Comparison Snapshot - 2013

Highlighted below, the socio-economic impact of the potential CBT Route could be significant, as transit access would increase for more than 22,000 people, including nearly 2,500 elderly persons and approximately 2,650 households earning less than \$25,000 per year. Additionally, over 1,300 households currently without access to an automobile would enjoy greater transit options.



Socio-Economic Profile			Difference
Total Population	10,426	33,050	22,624
Workforce Population (18-64)	8,358	23,855	15,497
Student Population (18-24)	1,323	3,974	2,651
Elderly Population (65+)	910	3,369	2,459
Forecasted Population Growth Per Year*	0.96%	0.96%	N/A
Total Households	4,932	14,104	9,172
Number of Households Earning < \$25,000	1,327	3,977	2,651
Number of Zero-Car Households	1,290	2,612	1,322

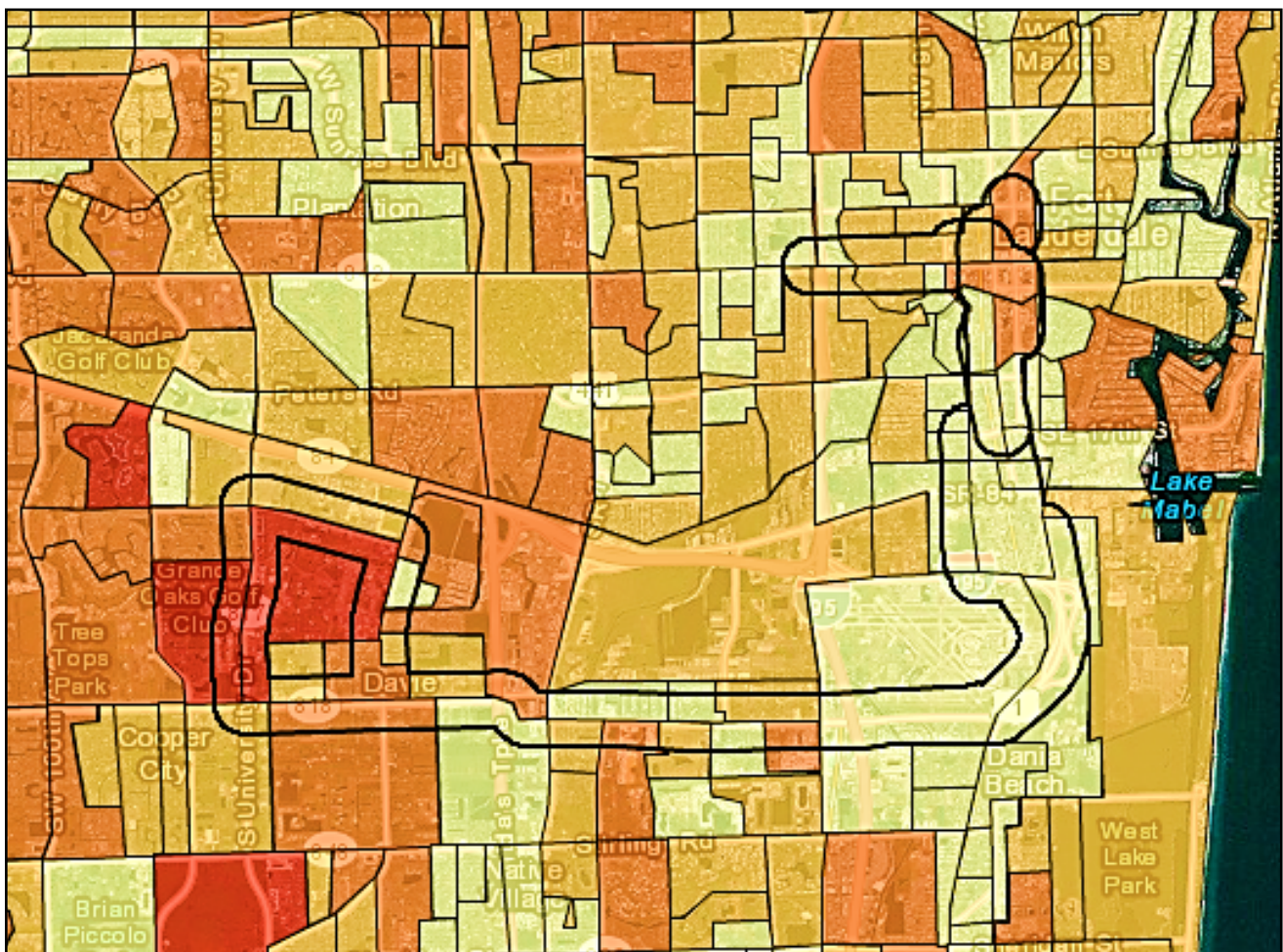
\* Through 2018

SOURCE: U.S. Census Bureau; Esri; 4ward Planning Inc., 2014

# Total Population

## Wave and Central Broward East-West Transit

Relative to the rest of the central Fort Lauderdale area, the CBT route is characterized by a large population by Census Block Group, particularly around the South Florida Education Center. The Wave Streetcar route and nearby neighborhoods also exhibit a relatively high population. Further, it should be noted that many of the block groups along the routes with lower population are the location of businesses and employment centers.



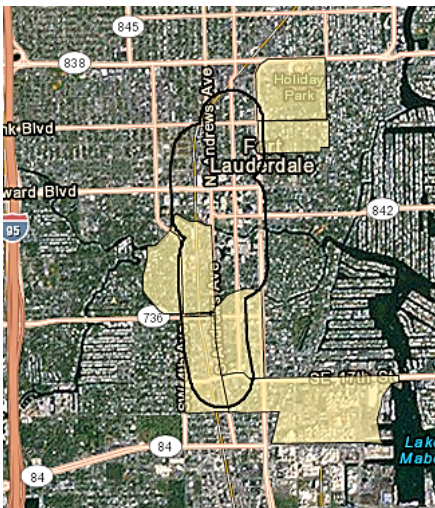
SOURCE: Esri; 4ward Planning Inc., 2014

# Total Population

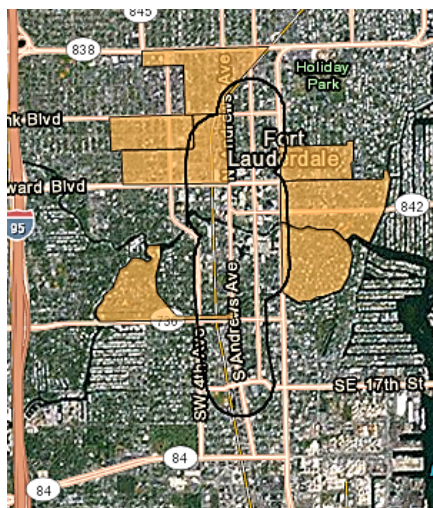
## Existing

For Census Block Groups located within the quarter-mile radius of the Wave Streetcar, population is largely concentrated along SE 3rd Avenue near the intersection with Las Olas Boulevard. On the southern end of the existing line, population is lower, indicative of non-residential land uses.

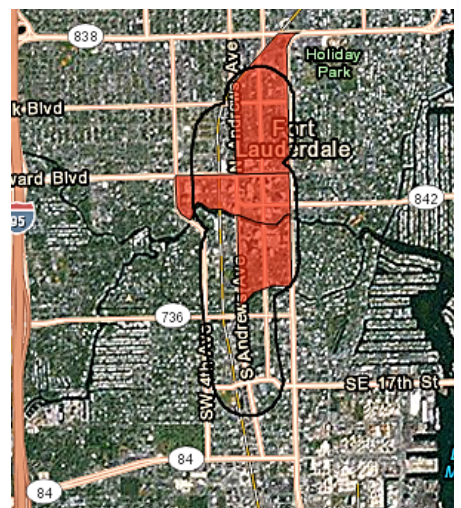
**Less than 1,000**



**Between 1,000 and 2,000**



**Greater than 2,000**

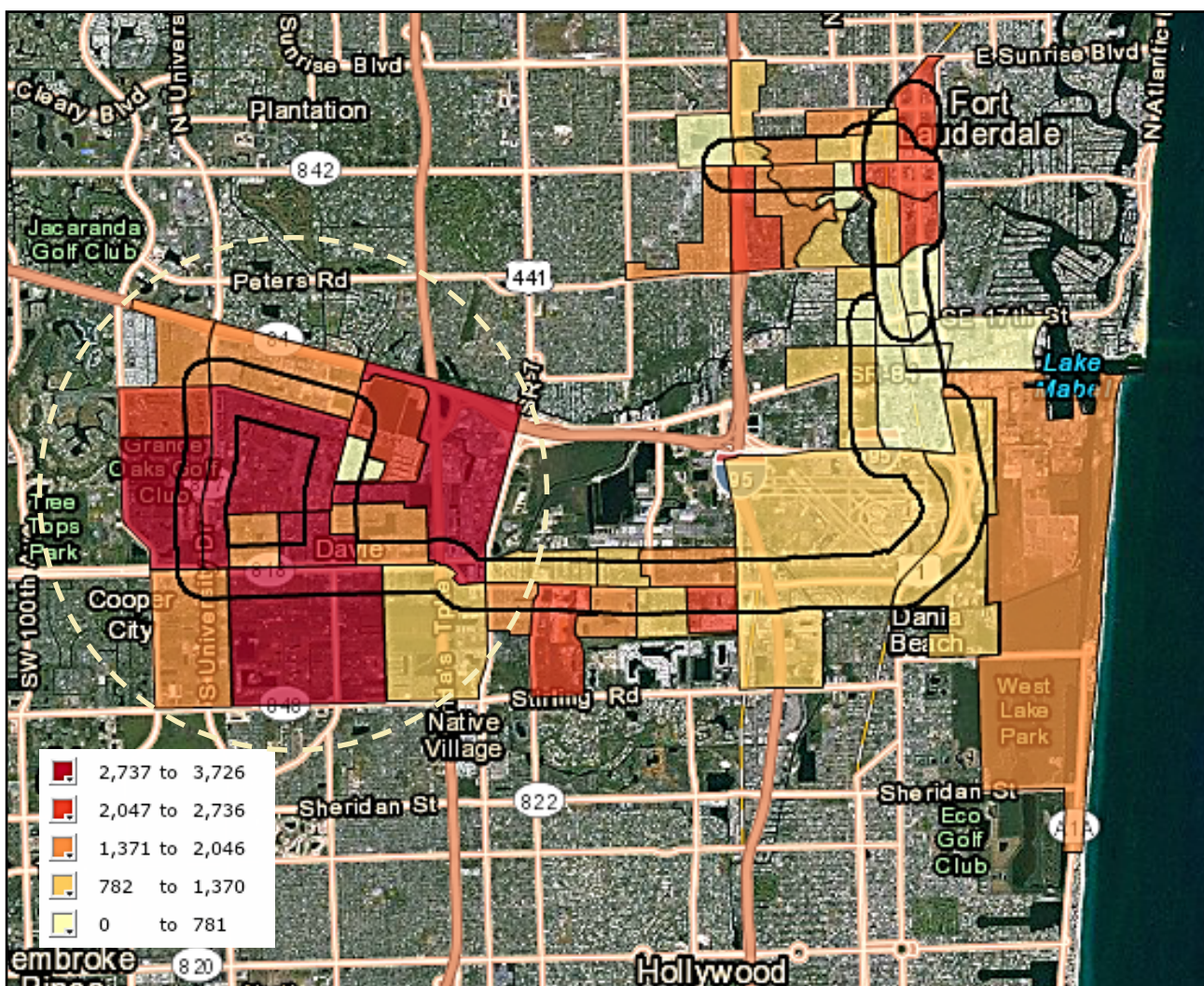


SOURCE: Esri; 4ward Planning Inc., 2014

# Total Population

## Wave and Central Broward East-West Transit

Shown below, CBT Route would reach a significant increase in population, particularly in and around the South Florida Education Center. Further, many of the block groups with a relatively low resident population feature a substantial amount of businesses and employees, including the airport and the area surrounding the intersection of SE 6th Avenue and State Road 84.



SOURCE: Esri; 4ward Planning Inc., 2014



# Total Population

## Population Age Trends

Consistent with regional and national trends, both the Wave and CBT route areas have experienced considerable growth in empty nester populations (ages 55 and up) in recent years, a trend that is very likely to accelerate through 2018.

Those aged 55 and older have demonstrated a growing propensity to use public transit, as many baby boomers have relocated to urban areas.

	Age Range
Pre-School-Age Children	< 5 yrs
Grade School-Age Children	5-14 yrs
High School and College-Age	15-24 yrs
Young Workforce and Grads	25-34 yrs
Early Stage Families	35-44 yrs
Late Stage Families	45-54 yrs
Young Empty Nesters	55-64 yrs
Older Empty Nesters	65-74 yrs
Mostly Retired	> 74 yrs

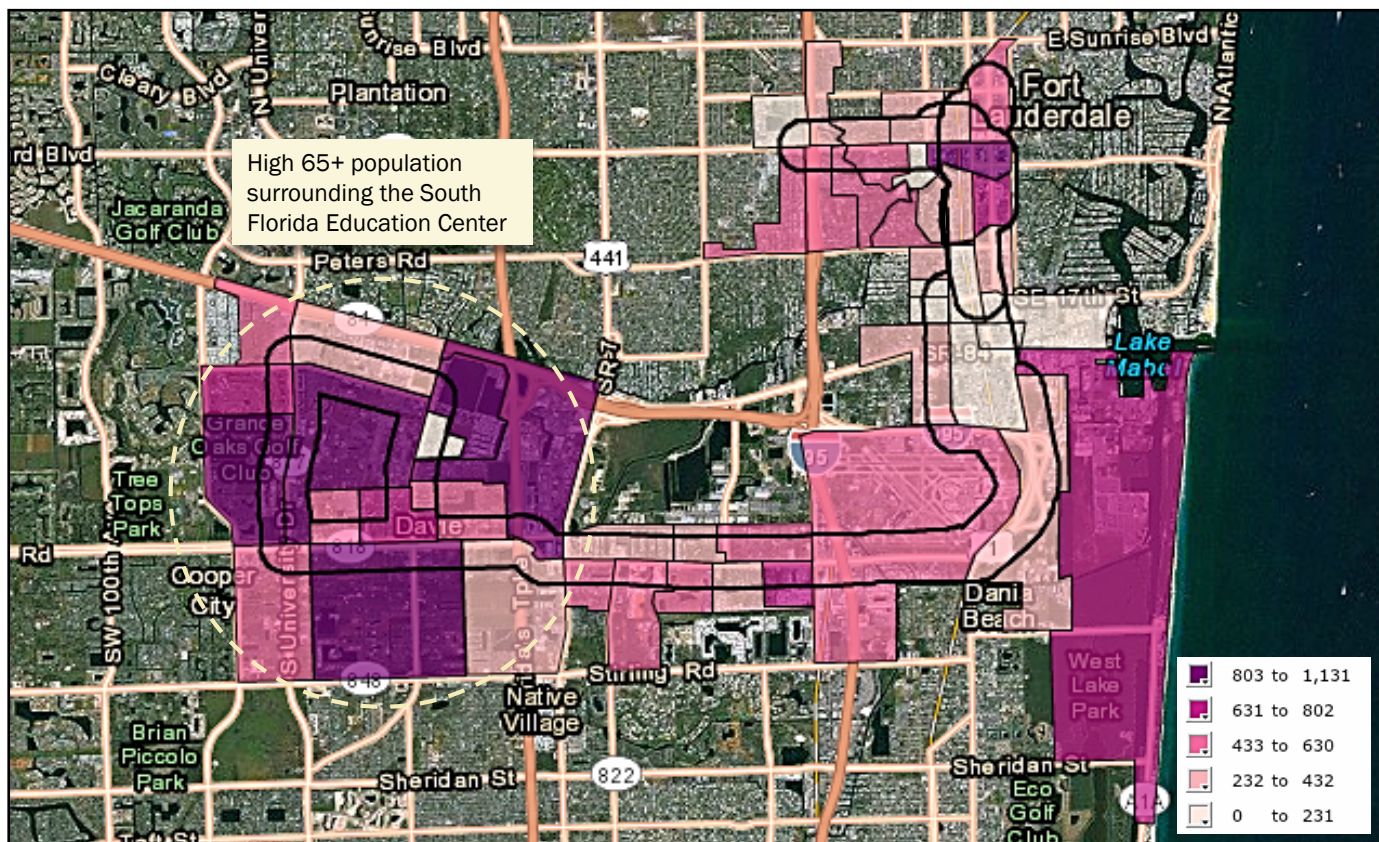
WAVE STREETCAR ROUTE							PERCENTAGE CHANGE	
	2010		2013		2018		2010-2013	2013-2018
Total Population	10,300	100.0%	10,426	100.0%	10,935	100.0%	0.9%	4.9%
Pre-School-Age Children	412	4.0%	408	3.9%	437	4.0%	-1.0%	7.2%
Grade School-Age Children	514	5.0%	560	5.4%	612	5.6%	9.0%	9.4%
High School and College Age	1,566	15.2%	1,515	14.5%	1,564	14.3%	-3.3%	3.2%
Young Workforce and Grads	2,993	29.0%	2,909	27.9%	2,832	25.9%	-2.8%	-2.6%
Early Stage Families	1,572	15.2%	1,616	15.5%	1,728	15.8%	-2.8%	6.9%
Late Stage Families	1,420	13.7%	1,387	13.3%	1,312	12.0%	-2.3%	-5.4%
Young Empty Nesters	1,073	10.4%	1,123	10.8%	1,214	11.1%	4.7%	8.1%
Older Empty Nesters	517	5.0%	608	5.8%	787	7.2%	17.6%	29.5%
Mostly Retired	264	2.6%	302	2.9%	437	4.0%	14.4%	44.8%

CBT ROUTE							PERCENTAGE CHANGE	
	2010		2013		2018		2010-2013	2013-2018
Total Population	32,970	100.0%	33,128	100.0%	34,755	100.0%	0.5%	4.9%
Pre-School-Age Children	1,898	5.8%	1,822	5.5%	1,946	5.6%	-4.0%	6.8%
Grade School-Age Children	2,969	9.0%	3,081	9.3%	3,336	9.6%	3.8%	8.3%
High School and College Age	5,094	15.5%	4,903	14.8%	4,796	13.8%	-3.8%	-2.2%
Young Workforce and Grads	6,471	19.6%	6,327	19.1%	6,291	18.1%	-2.2%	-0.6%
Early Stage Families	4,843	14.7%	4,837	14.6%	5,005	14.4%	-0.1%	3.5%
Late Stage Families	4,967	15.1%	4,737	14.3%	4,518	13.0%	-4.6%	-4.6%
Young Empty Nesters	3,721	11.3%	4,042	12.2%	4,449	12.8%	8.6%	10.1%
Older Empty Nesters	1,844	5.6%	2,153	6.5%	2,850	8.2%	16.8%	32.4%
Mostly Retired	1,162	3.5%	1,226	3.7%	1,564	4.5%	5.5%	27.6%

SOURCE: U.S. Census Bureau, Esri Community Analyst; 4ward Planning Inc., 2014

# Senior Population

## Wave and Central Broward East-West Transit

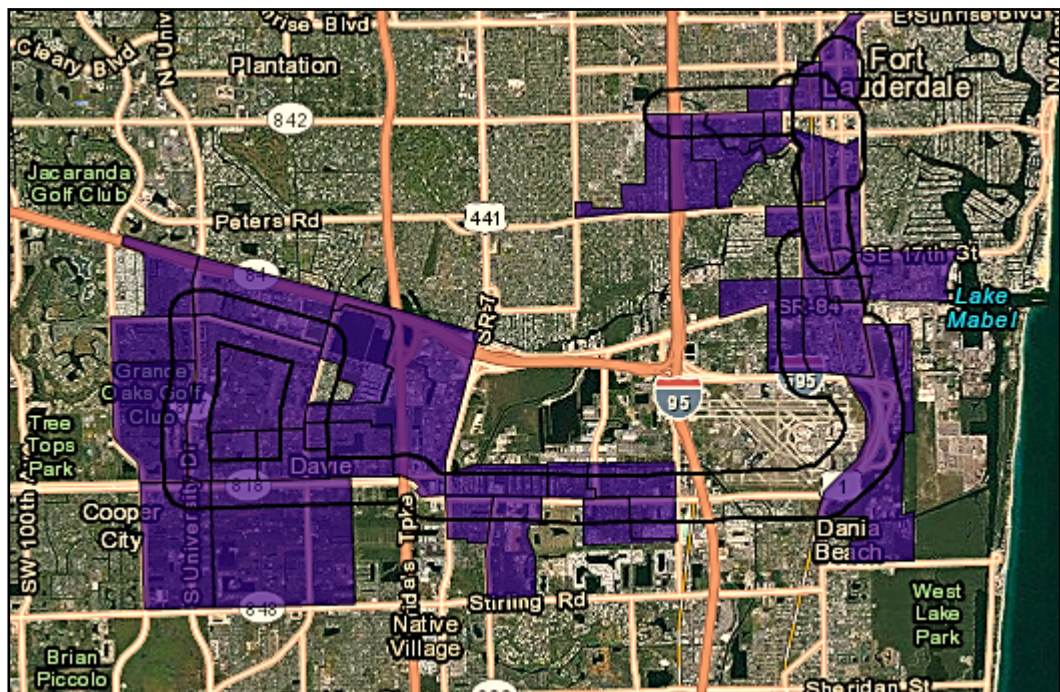
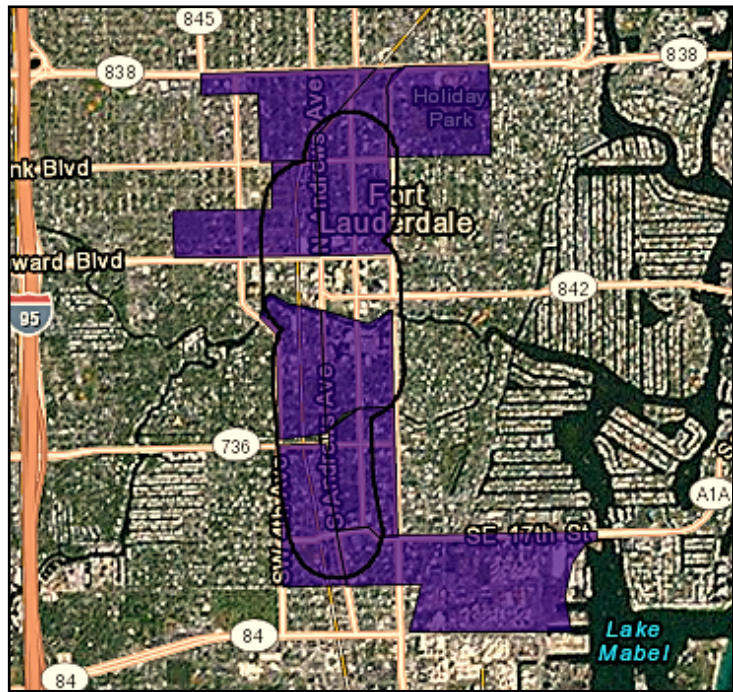


SOURCE: Esri; 4ward Planning Inc., 2014

# Racial Diversity

## Wave and Central Broward East-West Transit

The following maps highlight the Census Block Groups within both geographies that exhibit a Diversity Index of 50 or greater. Ranging from 0 (no diversity) to 100 (complete diversity), this measure represents the likelihood that two persons, chosen at random from the same area, belong to different racial or ethnic groups. Both the existing Wave Streetcar route and the potential CBT Route demonstrate relatively high levels of racial diversity – demonstrating that the proposed transit system would benefit a broad group of racial and ethnic groups.

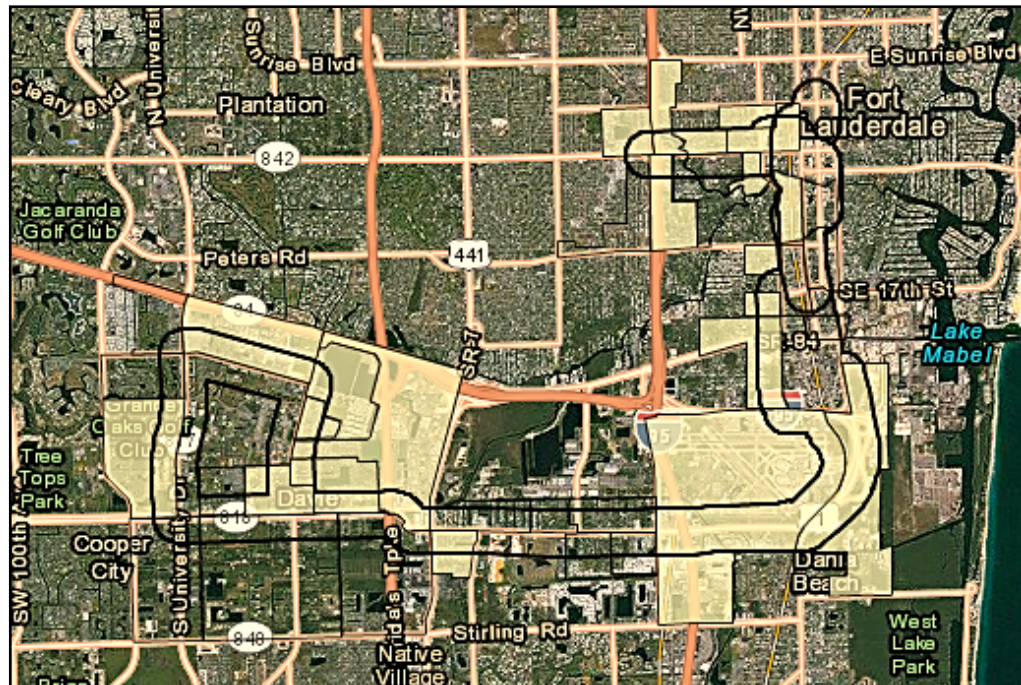


SOURCE: Esri; 4ward Planning Inc., 2014

# Per Capita Income

## Wave and Central Broward East-West Transit

According to the Broward County Income Category Chart based on the US Department of Housing and Urban Development (HUD) Area Income Limits Documentation System (located on following page), a single-person households is considered low-income if annual earnings are \$38,650 or less. Displayed above are the block groups within both geographies that are characterized by a per capita income of \$38,650 or less. **While the translation from single-person households to per capita income is imperfect, it nevertheless demonstrates that the CBT Route could reach a considerably higher number of low-income households, than would the presently approved Wave Streetcar route.**



SOURCE: Esri; HUD; 4ward Planning Inc., 2014

# Broward County Area

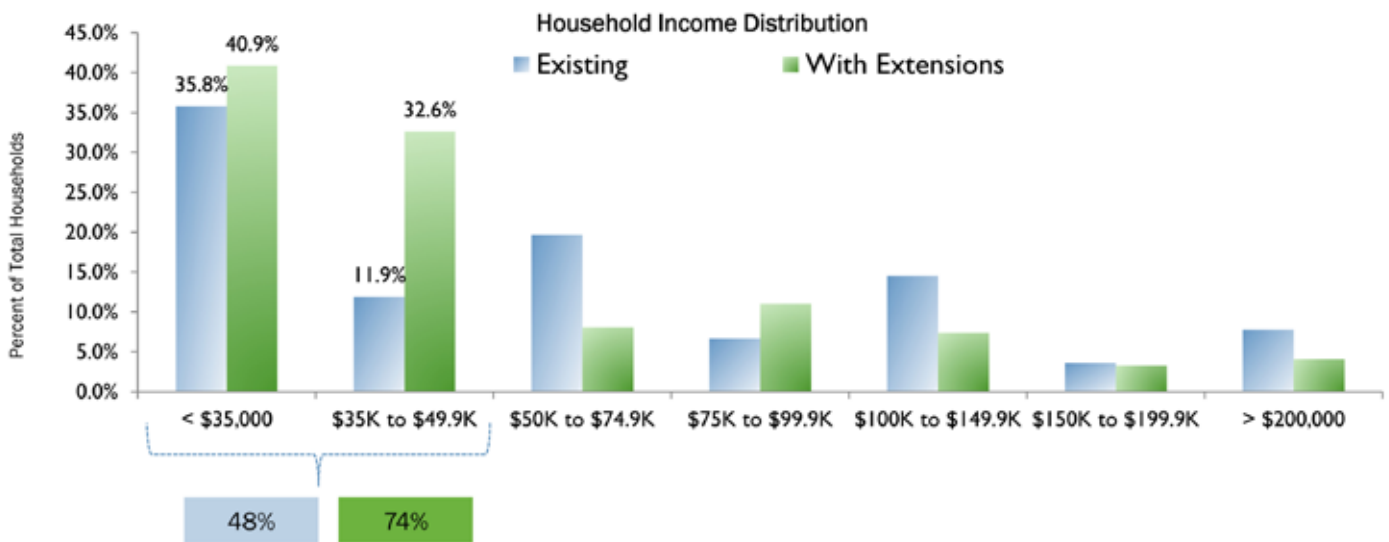
## Median Income Benchmarks

Household Size	Extremely Low (30%)	Very Low (50%)	Low (80%)	Moderate (120%)
1 person	\$14,500	\$24,150	\$38,650	\$57,960
2 people	\$16,000	\$27,600	\$44,200	\$66,240
3 people	\$18,650	\$31,050	\$49,700	\$74,520
4 people	\$20,700	\$34,500	\$55,200	\$82,800
5 people	\$22,400	\$37,300	\$59,650	\$89,520
6 people	\$24,050	\$40,050	\$65,050	\$96,120

SOURCE: Esri; HUD; 4ward Planning Inc., 2014

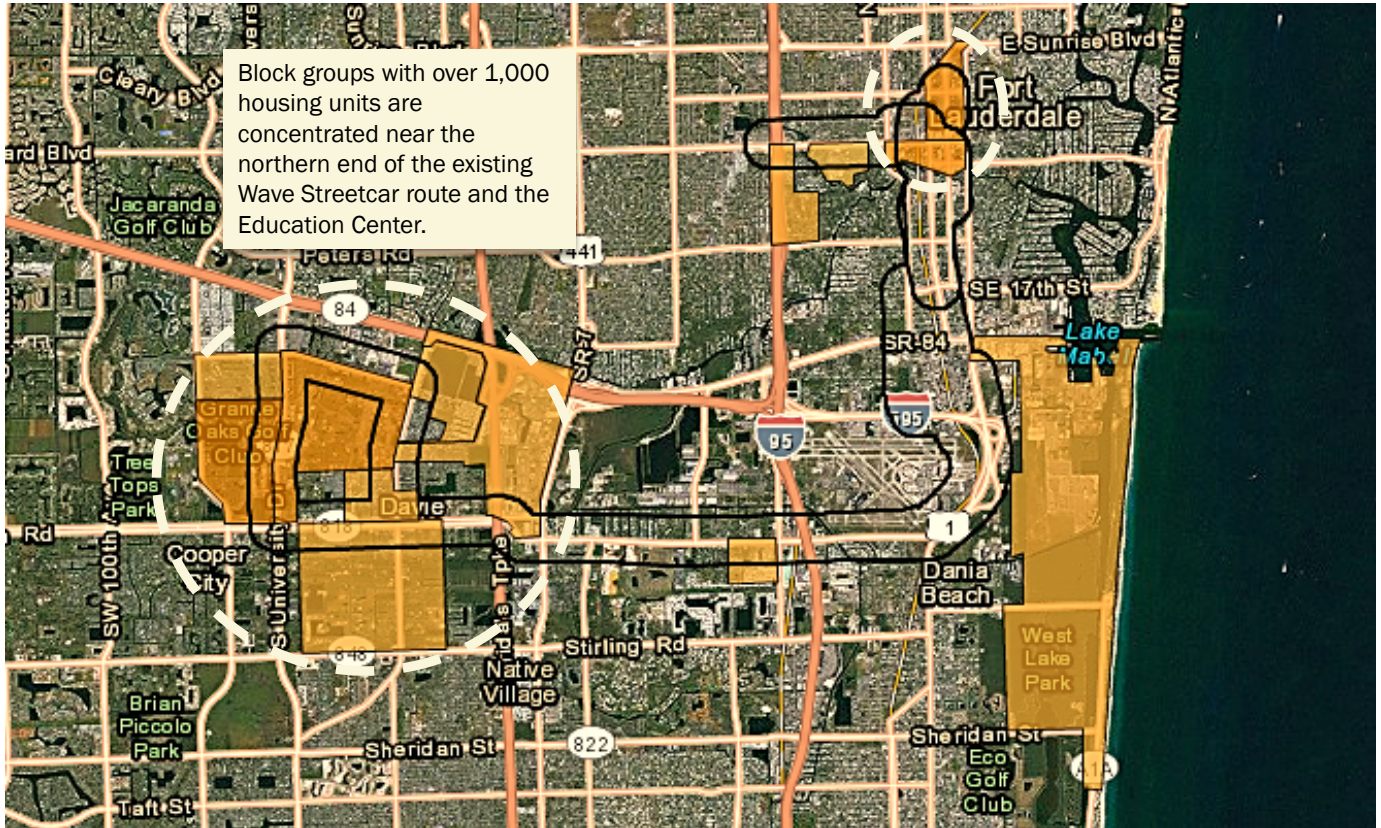
## Income Distribution

As exhibited below, over one-third of households within a quarter-mile radius of the Wave Streetcar route earned less than \$35,000 in 2013, while over four in ten households within the CBT route geography earned \$35,000 or less. While a wide range of income groups have been shown to use public transit, **over 65 percent of public transit users have annual incomes under \$50,000, according to the American Public Transportation Association report entitled *Profile of Public Transportation Passenger Demographics and Travel Characteristics Reported in On-Board Surveys***. CBT Route would increase accessibility for the share of total households earning under \$50,000 annually from just under 50 percent to nearly 75 percent.



SOURCE: U.S. Census Bureau; Esri; 4ward Planning Inc., 2014

# Housing Units



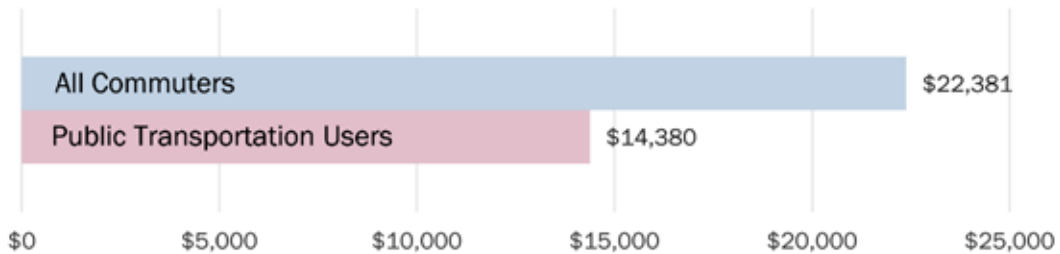
SOURCE: Esri; 4ward Planning Inc., 2014

# Commuter Demographics

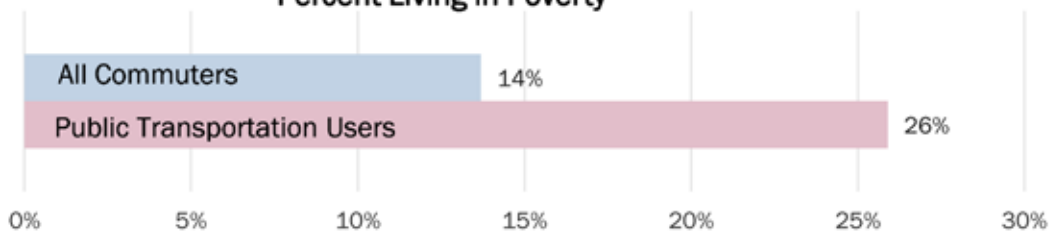
## In The Miami Metro Region

Public transportation users within the Miami region are disproportionately lower wage earners by a significant margin and are nearly twice as likely to live in poverty, relative to all commuters. Further, while the black population represents approximately 14 percent of the total commuters within the region, they are disproportionately more likely to use public transportation at over a quarter of all transit users. Non-Hispanic whites are disproportionately unlikely to use public transportation, they represent 15 percent of total commuters but only six percent of all public transportation users.

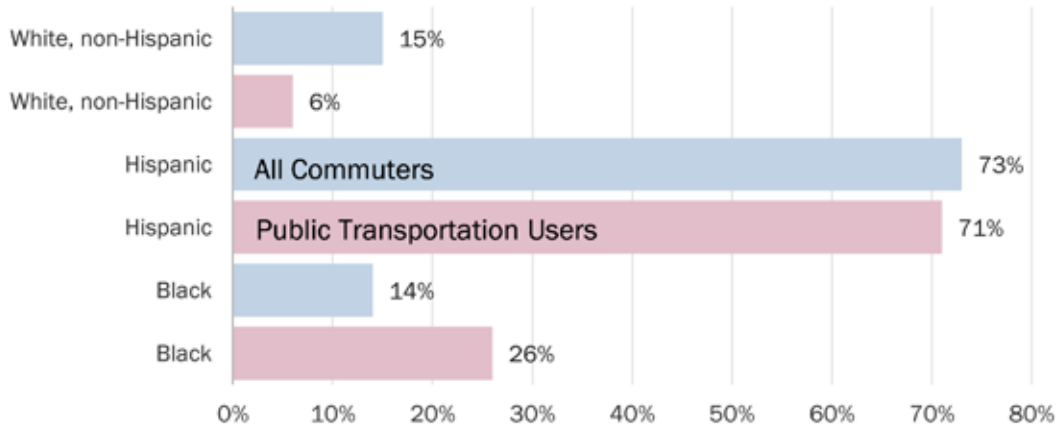
**Median Earnings**



**Percent Living in Poverty**



**Race and Ethnicity**

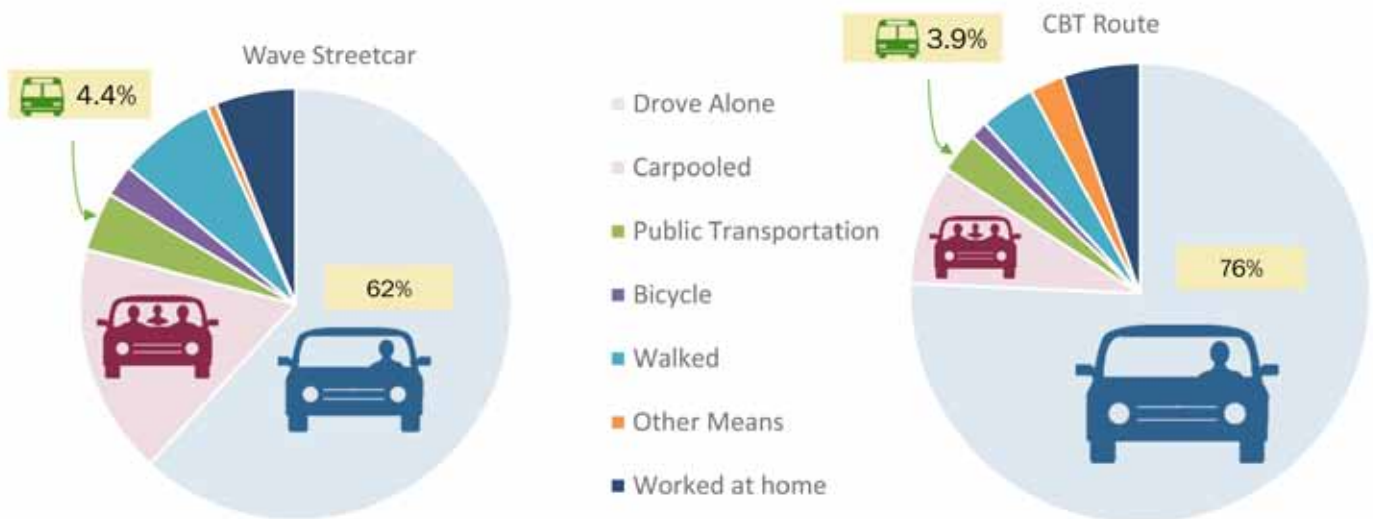


SOURCE: U.S. Census Bureau; Esri; 4ward Planning Inc., 2014

# Commuter Demographics

## Means to Work

While implementation of the Wave Streetcar route would likely increase the percentage of residents who utilize public transportation as a means to work, both geographies currently maintain a relatively low percentage of employed persons who use public transit. Nearly two-thirds of workers living in the existing corridor and over three-fourths of workers living along potential CBT Route drive alone to work. Research from the University of California has documented that increased walkability, with regard to transit access, significantly increases the likelihood of transit use among local residents.



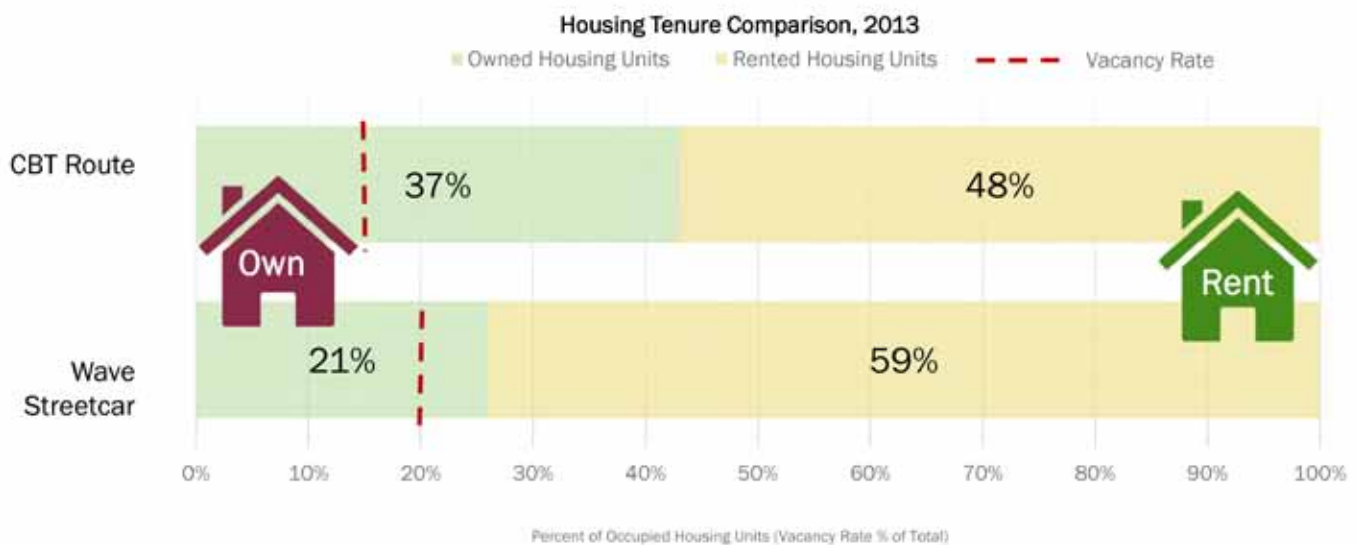
SOURCE: Esri; Sungjun Park, UC Berkley; 4ward Planning Inc., 2014



# Socio-Economic Trends

## Housing Tenure Trends

The figure below comparatively illustrates the trends in housing tenure for the two study geographies, indicating that the proposed CBT route are characterized by a greater share of renter-occupied units, relative to owner-occupied housing units. The trends highlighted below are likely to remain constant through 2018. A 2008 report by San Francisco State University found that public transportation riders are overwhelming renters, outnumbering home-owners by a rate of two to one. Lastly, while both geographies currently exhibit relatively high vacancies rates, the implementation of the Wave has the potential to reduce the rate of vacancy as accessibility and desirability increases.



SOURCE: US Census Bureau; Esri; SFSU; 4ward Planning Inc., 2014

# Socio-Economic Trends

## Takeaway

The preceding analysis of socio-economic trends for the quarter-mile radii of the existing Wave Streetcar route and the CBT route provides insight into the population, housing, and demographic characteristics of the area. While the number of residents in both geographies that currently use public transportation is low, there are a number of indicators which are favorable to prospective investment for further public transportation access, including CBT Route, within the area:

- There are nearly 1,300 zero-car households within the quarter-mile corridor of the existing Wave Streetcar route and over 2,600 including potential CBT Route. Transportation investment could considerably increase the mobility options of this cohort.
- Extending the Wave Streetcar would offer the possibility of greatly increasing public transportation access to low-income households, who are disproportionately more likely to use public transit. However, the potential rise in property prices near the route, as a result, may warrant some sort of housing cost containment for the aforementioned households and a land-use policy focused on the provision of a certain share of workforce housing within walking distance of a streetcar stop.
- A fast growing segment of persons 55 years of age and older should contribute to a rise in ridership in the areas, as this age segment has demonstrated a growing propensity to use public transportation. Accordingly, communicating the prospective benefits to this age cohort is deemed extremely important, with respect to a future capital funding campaign – this age group contains a high share of voters!

# Employment Centers and Commuting Trends

## Key Findings: **Wave Streetcar Zone**

### **1 live inside, 14 live outside**

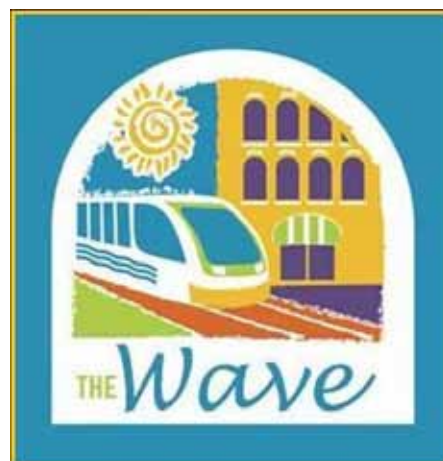
The Wave Streetcar Zone, the area located within a 1,000 square feet of the Wave Streetcar route, is primarily an inflow area; for every person who lives there, there are 14 who live outside the area and commute in for work. More than half of these workers (54 percent) are high income workers and in high wage industries like business services (15 percent of all workers), finance (6 percent), healthcare (16 percent), and public administration (28 percent).

### **60 low income workers live and work within 1,000 square feet**

Of the 2,343 residents living within the Wave Streetcar Zone, only 388 people both live and work. Of these, only 15.5 percent (60 people) earn less than \$1,250 per month—representing low income workers most likely to want or need reliable, inexpensive public transit.

### **Major tourism destinations and employment centers missed**

The Wave Streetcar route does not support major tourism destinations, such as the airport or seaport, or service major employment centers such as the airport and the South Florida Education Center, for those living along the Wave Streetcar Zone. However, for those who work in the sphere of influence, most live to the north of the area of influence in scattered housing developments. While the most dense areas are directly to the east, and in Lauderhill, there is not one majority concentration of workers in the area.



# Employment Centers and Commuting Trends

## Key Findings: **Central Broward East-West Transit - Airport Segment**

### **1 live inside: 12 live outside**

The airport segment is still an inflow area, with one resident living there for every 12.5 workers. This number is slightly smaller than on the initial streetcar route, which means the airport segment will service more of those who live along the extended route than the initial route.

### **102 low income workers live and work within 1,000 square feet**

Of the 3,598 residents living within 1,000 feet of the Extended Zone streetcar route, only 639 persons both live and work along the route. Of these, only 16 percent (102 people) are low income workers—those most likely to want or need reliable, inexpensive public transit.

### **No service to the South Florida Education Center**

The airport segment does not provide service to the South Florida Education Center. The largest clusters of employment (other than the Education Center) are serviced by this segment, but the majority of employment for those living along the route is not concentrated in specific centers.

### **10,000 more workers serviced, but only 1,000 more residents**

The airport segment services almost 10,000 more jobs than the initial streetcar track, but only about 1,000 additional residents, approximately a third of which both live and work within the sphere of influence.

## CENTRAL BROWARD



T R A N S I T S T U D Y

# Employment Centers and Commuting Trends

## Key Findings: **Central Broward East-West Transit - Full Route**

### **1 live inside: 4 live outside**

The full CBT route is still an inflow area, with one resident living there for every 4.2 workers. This number is much smaller than for the Wave, which means this route will more likely serve the population working and living in the area, rather than commuting into the area.

### **517 low income workers live and work within 1,000 sqft**

Of the 16,800 residents living within 1,000 feet of the full CBT route, only 2,446 persons both live and work along the route. Of these, only 21.1 percent (517 people) are low income workers—those most likely to want or need reliable, inexpensive public transit.

### **Dense job clusters serviced, but most residents along alignment work elsewhere**

The largest clusters of employment are serviced by the full CBT route, but the majority of employment for those living along the route is not concentrated in specific centers, and 7 in 8 residents who live along the alignment do not work along it.

### **96 percent do not live in the sphere of influence**

For those who work along the streetcar alignment, 96 percent do not live in the sphere of influence. Key worker residencies outside the streetcar influence include Lauderdale, Plantation, Sunrise, and Davie. People who work in the area of influence live as far south as Miami and as far north as Palm Beach Gardens.

## CENTRAL BROWARD



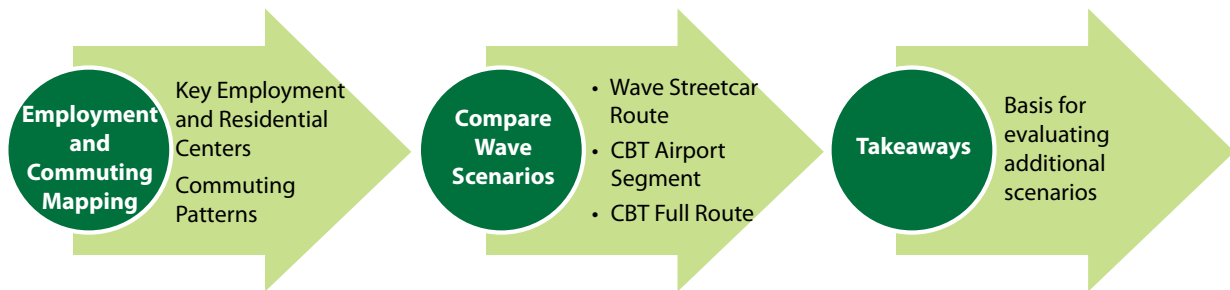
T R A N S I T S T U D Y

# Employment Centers and Commuting Trends

## Methodology

If the Wave Streetcar route is to be an effective means of transit for residents and tourists of Broward County, it needs to service the locations residents, workers, and tourists wish to go. This includes residences, attractions, and places of employment. As currently proposed, the 2.7 mile Wave Streetcar route would service relatively few residents and workers; and a fewer still low-income Broward County households both live and work along the route. The CBT route has the potential to connect the Wave with other employment and transportation centers, including the Convention Center/Port Everglades, two Tri-Rail stations (Fort Lauderdale and Fort Lauderdale-Hollywood International Airport Tri-Rail); and the South Florida Education Center.

The following section of this report compares employment and commuting patterns for both the Wave and CBT routes. Using OnTheMap, a US Census visualization tool, in conjunction with Esri, key employment and housing centers along the Wave Streetcar route were mapped. Commuting and income patterns for persons working and living within the area of influence (areas within 1,000 feet of the route) and the proposed CBT routes were analyzed.



# Employment Centers and Commuting Trends

## How To Read The Heat Maps

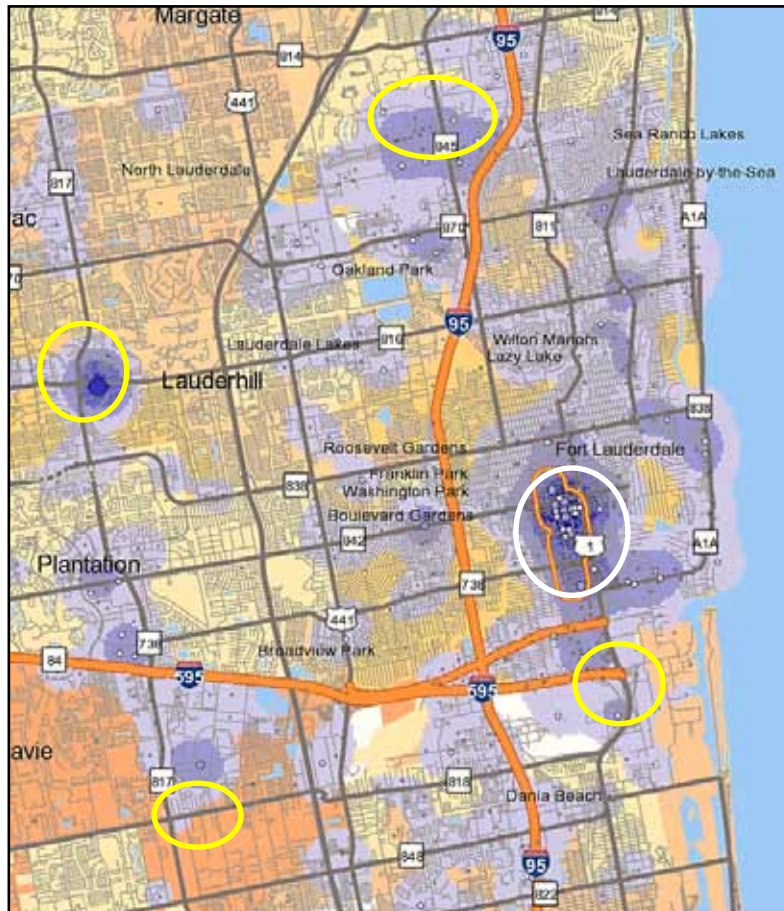
The following maps show either where people live who work within the Wave Streetcar's sphere of influence (a 1,000 foot buffer from either side of the route), or where they work if they live within the sphere.

### Example: Where workers live heat map

The blue areas show where people work who live within the sphere of influence (the orange bubble, which is circled in white here for easy visibility). As can be seen by the blue heat gradations, there are a number of persons who work well outside of the existing Wave alignment.

However, this map demonstrates that people who live in the sphere of influence, primarily, also work in the sphere of influence, and also in areas to the west, south, and north (circled in yellow).

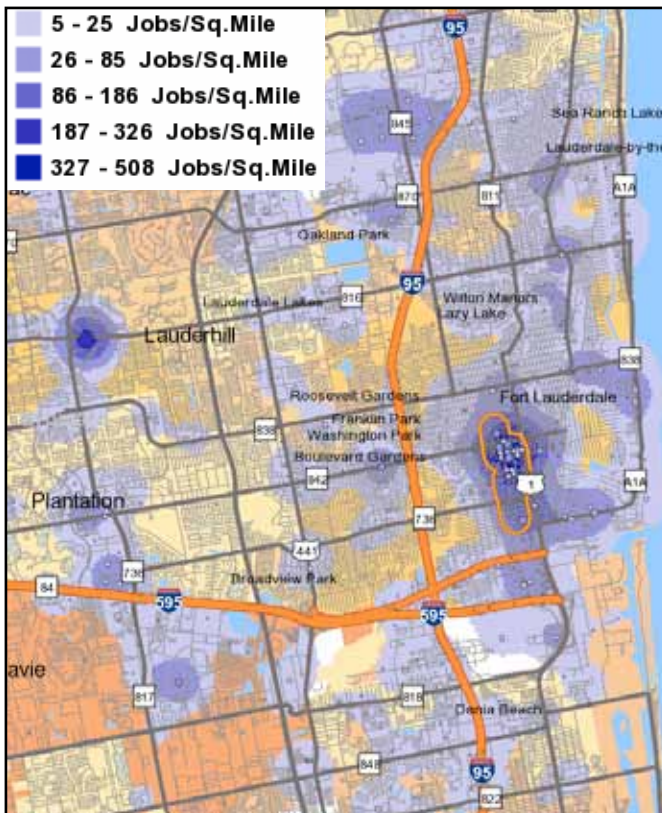
Further analysis in this report examines how well area employed workers would be serviced by the Wave streetcar system and which high employment areas or high density housing areas might be overlooked.



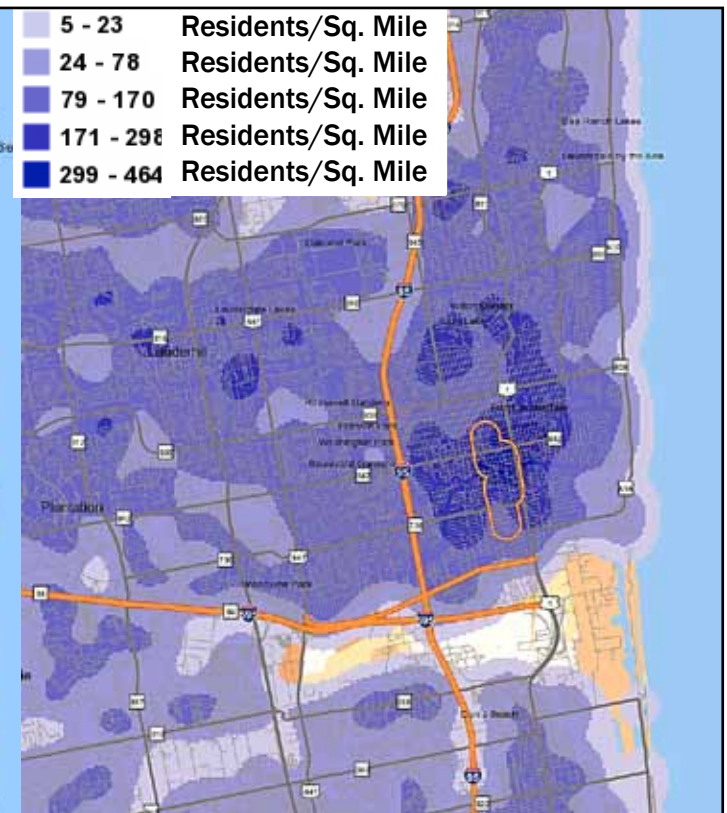
# Employment Centers and Commuting Trends

## Wave Streetcar Route:

**Where People Work who Live near the Wave Streetcar Route**



**Where People Live who Work Near the Wave Streetcar Route**



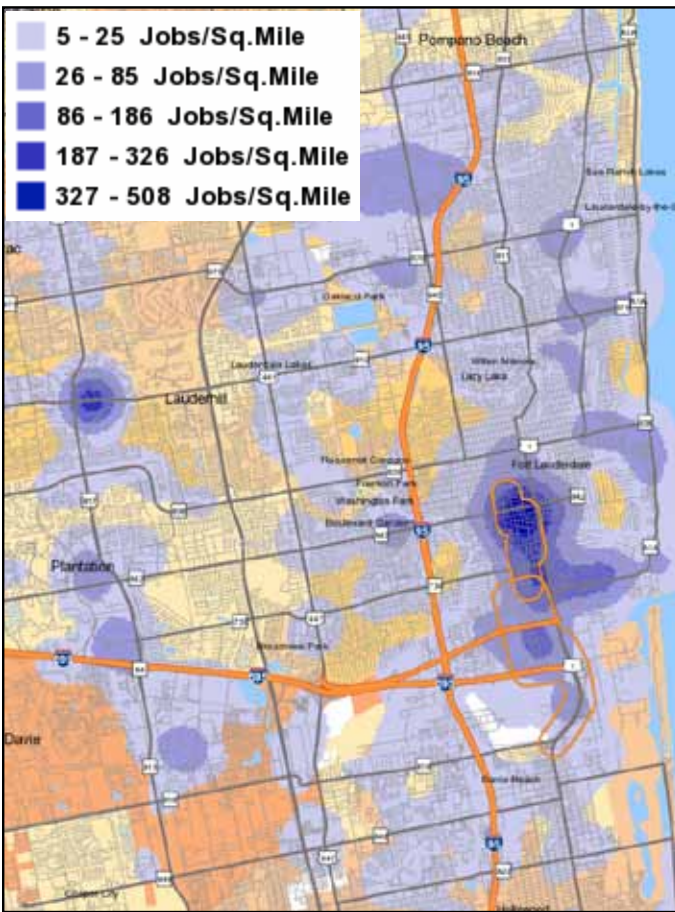
SOURCE: On The Map U.S. Census



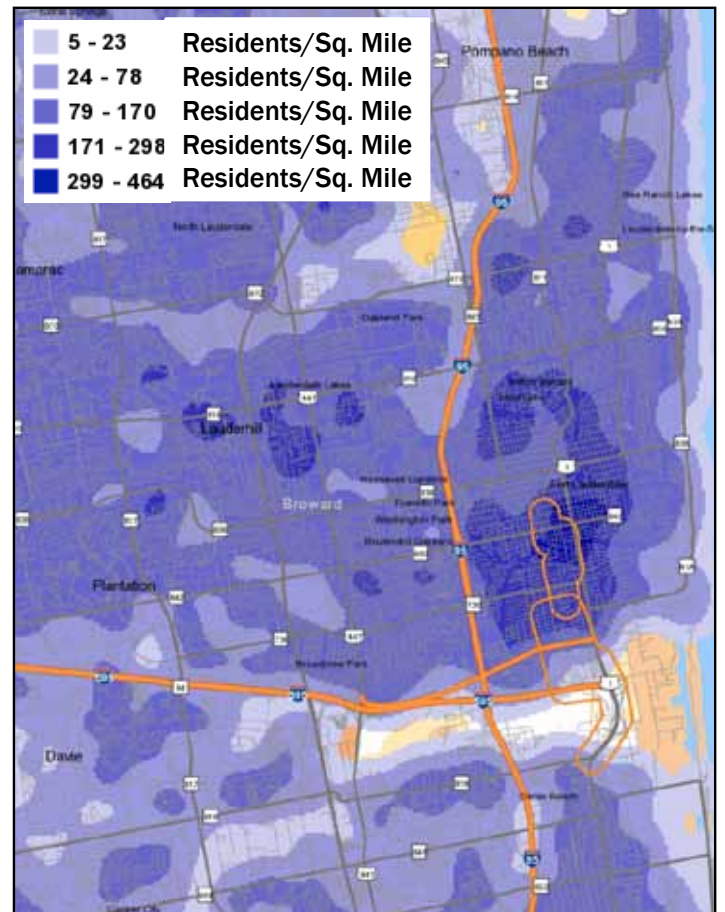
# Employment Centers and Commuting Trends

## CBT Airport Segment:

**Where People Work who Live near the Airport Segment**



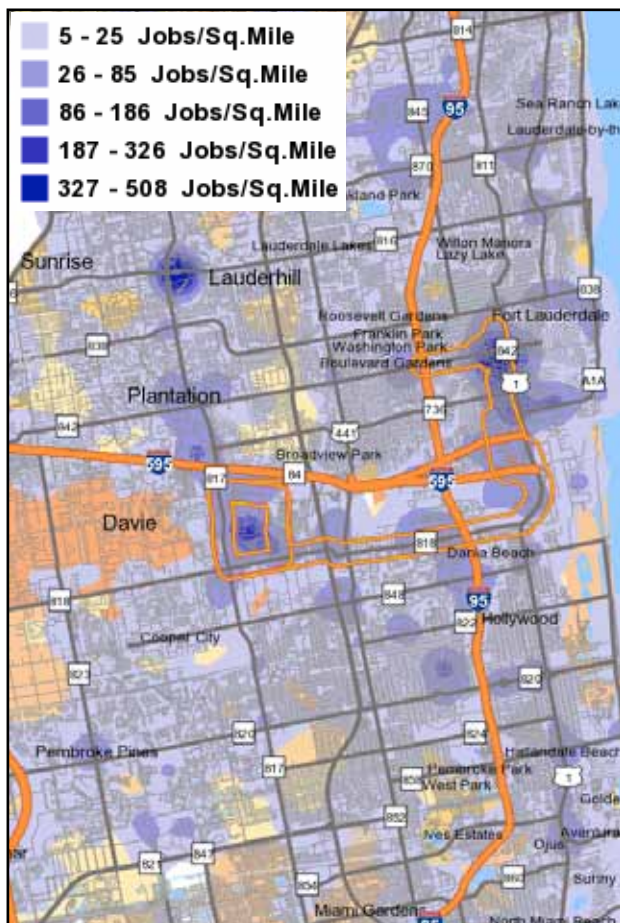
**Where People Live who Work Near the Airport Extension**



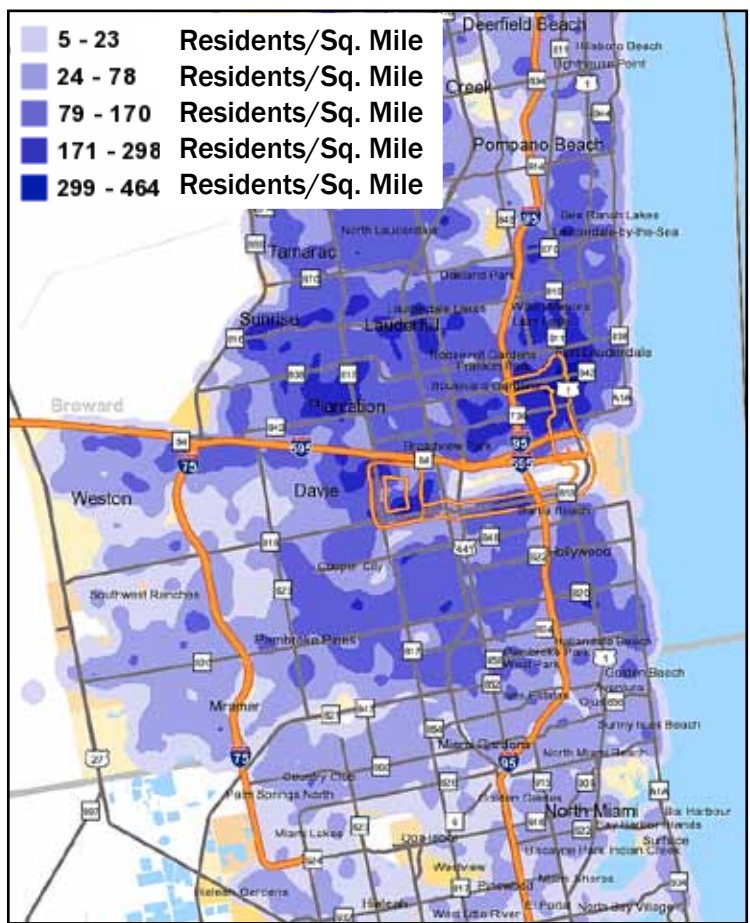
# Employment Centers and Commuting Trends

## CBT Route:

**Where People Work who Live near the CBT Route**



**Where People Live who Work Near the CBT Route**



SOURCE: On The Map U.S. Census

# Employment Centers and Commuting Trends

## Inflows and Outflows:

### How Many People Both Live and Work in Each Area?

- Only 6.7 percent of all persons who work within 1,000 feet of the Wave Streetcar route live there. This share is higher for the Airport expansion scenario (8.1 percent) and CBT Route scenario (25.4 percent).
- Of the 2,343 residents living within 1,000 feet of the Wave Streetcar, only 16.6 percent (388 people) both live and work along the route. This share is higher for the Airport expansion scenario (17.7 percent) but lower for the CBT Route scenario (14.6 percent).
- Fifty-seven percent of those work within 1,000 feet of the Wave Streetcar route (222 persons) make more than \$3,333 per month in income. This share is lower within for the Airport expansion scenario (52.7 percent) and CBT Route scenario (41.9 percent).

Selection Area Labor Market Size (All Jobs) 2011	Wave Streetcar Route		Airport Extension		Full Extension	
	Count	Share	Count	Share	Count	Share
Employed in the Selected Area	34,981	100%	44,370	100%	66,168	100%
Living in the Selected Area	2,343	6.7%	3,598	8.1%	16,800	25.4%
	<b>32,638</b>	<b>-</b>	<b>40,772</b>	<b>-</b>	<b>49,368</b>	<b>-</b>
<b>Interior Flow Job Characteristics (All Jobs) 2011</b>						
	Count	Share	Count	Share	Count	Share
Workers Aged 29 or Younger	69	17.8%	102	16.0%	442	18.0%
Workers Aged 30 to 54	232	59.8%	385	60.3%	1,433	58.59%
Workers Aged 55 or Older	87	22.4%	152	23.8%	571	23.34%
Workers Earning \$1,250 per month or Less	60	15.5%	102	16.0%	517	21.14%
Workers Earning \$1,251 to \$3,333 per month	106	27.3%	200	31.3%	905	37.00%
Workers Earning More than \$3,333 per month	222	57.2%	337	52.7%	1,024	41.86%
Internal Jobs Filled by Residents	<b>388</b>	<b>100%</b>	<b>639</b>	<b>100%</b>	<b>2,446</b>	<b>100%</b>
Shared by Residents		<b>16.6%</b>		<b>17.7%</b>		<b>14.6%</b>

SOURCE: On The Map U.S. Census

# Employment Centers and Commuting Trends

## Takeaways

Employment and commuting in Broward County is often done over long distances. 48 percent of those who work along the CBT route live at least 10 miles away from their employment. These people also live in fairly low-density communities, making public transit harder to use.

TOD research shows that low income households are more likely to use public transit than higher income households (which are more likely to drive). The Wave Streetcar route primarily services wealthy households while only 15.5 percent (60 people) of the population working and living on the route are characterized as low income workers.

While the CBT route serve more people, including a larger share of low-income workers at the airport and education center, less than 3,000 people both live and work within 1,000 of the extended route. The streetcar would need transfers to other forms of public transit to service other key employment centers, like Miami.

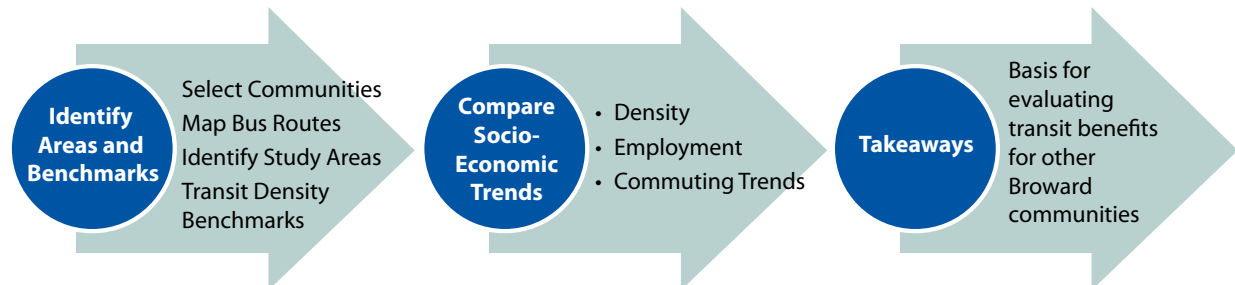
While the CBT route to the Tri Rail Griffin Road station directly services very few residences or employment centers, the Tri Rail's ability to connect Fort Lauderdale to other South Florida cities is crucial; again, almost half of all those who work in downtown Fort Lauderdale live 10 miles away or more.

Since Fort Lauderdale's worker population overwhelmingly live in suburban housing, a key plan for Broward County to consider is encouraging apartment construction of varying affordability brackets, both luxury and affordable, along the streetcar route to entice transit oriented development, like Memphis or Seattle.

# Broward Communities

## Minimum Transit Benchmarks and Socio-Economic Indicators:

Key socio-economic trends were examined for the cities of Sunrise, Plantation, Miramar, and Hollywood (“selected communities”), and Fort Lauderdale and Broward County, for comparative purposes. Based on identified population clusters along existing bus routes, Comparisons of key socio-economic trends for a quarter- and half-mile radius of five study areas within each selected community were completed, juxtaposed with an example study area along the potential CBT route. Key trends were compared with recommended minimum transit density benchmarks provided by the Florida Department of Transportation (FDOT). Where appropriate, identified transit benchmarks (e.g. population per acre) were utilized as breaks in the separation of mapping classifications. The following quantitative analysis is based on data provided by **Esri’s Community Analyst** software (a socio-economic data analysis tool based on data provided by the U.S. Census) and **OnTheMap** (a U.S. Census visualization tool for mapping key employment centers). Commuting and income patterns for persons working and living within each selected community and study area were also analyzed.

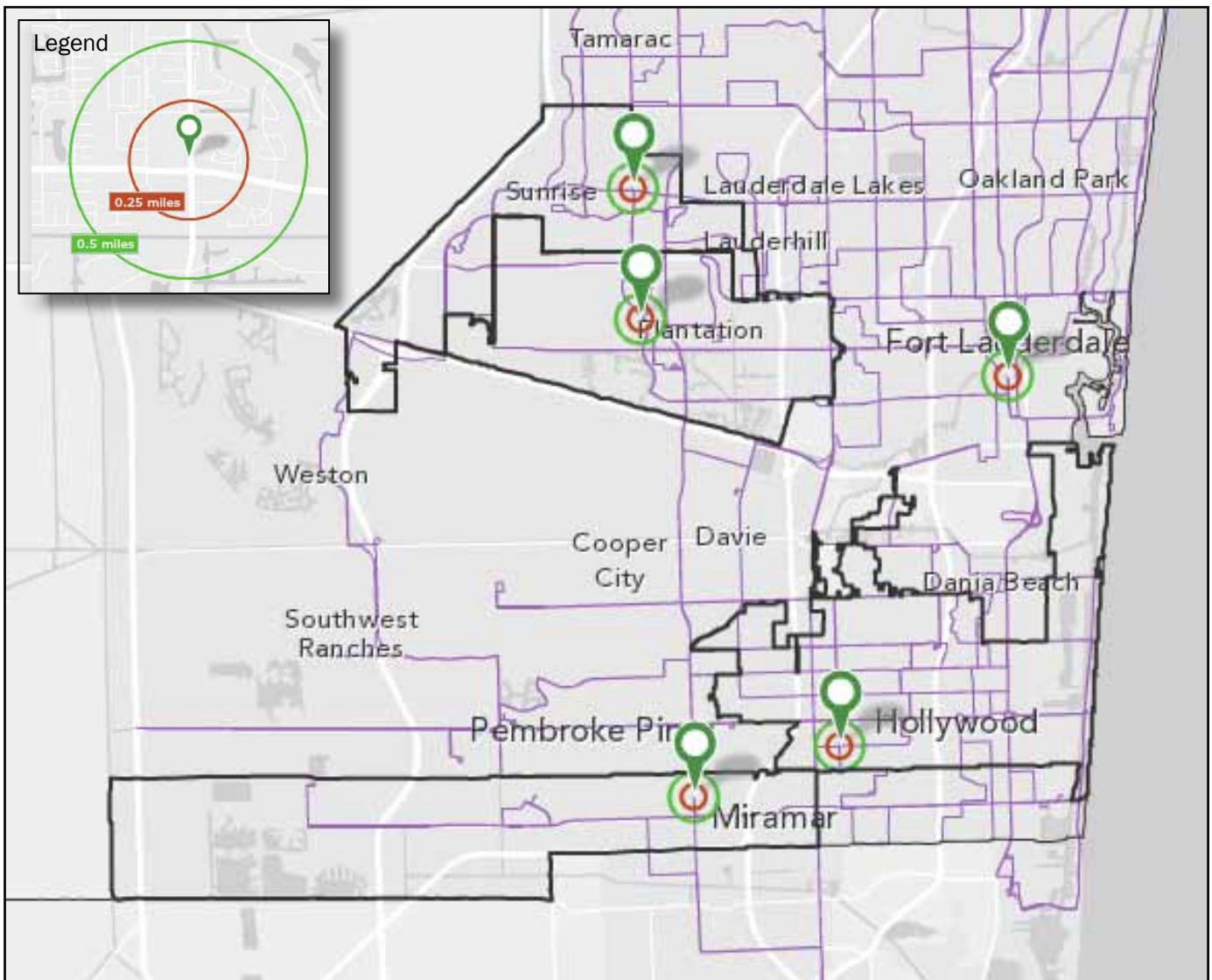


# Background

## Selected Communities and Study Areas

Half-mile Study Areas were selected for each community from the following intersections:

- Miramar - Miramar Blvd and S University Dr
- Plantation - Cleary Blvd and N Pine Island Rd
- Hollywood - S 56th Ave and Washington
- Sunrise - W Oakland Park Blvd and N Pine Island Rd
- Wave - SW 7th St and S Andrews Ave



# Broward Communities

## Minimum Transit Benchmarks

Transit Oriented Development (TOD) Design Guidelines developed by the Florida Department of Transportation (FDOT) provide density standards that should be considered when planning for and implementing transit station area development. Key residential, population, and employment benchmarks can help provide Broward County communities a means for evaluating existing socio-economic characteristics and their potential to support additional transit service or infrastructure. For purposes of this analysis, transit minimums are compared with existing socio-economic trends within selected communities, overall, and with each study area.

A Florida State research team, led by urban planning scholar Gregory Thompson, analyzed more than 40,000 bus trips taken in Broward circa the 2000 Census and found that population, median income, employment, and, to some extent, parking fees near work were all significant factors in transit ridership.



SOURCE: What Really Matters for Increasing Transit Ridership: Understanding the Determinants of Transit Ridership Demand in Broward County, Florida, Urban Studies, November 2012

### Design Guidelines Matrix (Selected Criteria)

	Urban Core		Urban General		Suburban				Rural
	Commuter Rail/LRT/BRT	Local Bus Hub	Commuter Rail/LRT/BRT	Local Bus Hub	LRT/BRT	Commuter Rail	Local Bus Hub	Express Bus	Express Bus
Residential Density (Dwelling Units per Acre)	>35	15 to 20	25 to 35	15 to 25	20 to 25	20 to 30	10 to 20	5 to 10	5 to 10
Population Density (Persons/Acre)	>85	40 to 50	65 to 85	45 to 65	45 to 65	50 to 80	25 to 50	15 to 30	10 to 25
Employment Density (Employees/Acre)	>500	150 to 200	100 to 150	75 to 100	30 to 40	20 to 30	10 to 25	2 to 5	2 to 5
Housing Ratio	1.36	0.91	0.45	4.00	0.14	0.09	0.09	0.08	0.08
Percent Residential	20%	30%	50%	50%	70%	80%	80%	90%	90%
Percent Non-Residential	80%	70%	50%	50%	30%	20%	20%	10%	10%

SOURCE: Florida Department of Transportation, Design Guidelines Matrix

# Key Findings

## Minimum Transit Benchmarks

The chart below compares key socio-economic indicators such as residential, population, and employment density for Sunrise, Plantation, Miramar, and Hollywood, and Fort Lauderdale cities and Broward County (for comparative purposes) with previously identified minimum density benchmark by transit type. In general, each selected community and study area fell below minimum residential and population densities recommended for supporting suburban express bus service, but met minimum employment densities.

### Minimum Transit Benchmarks: Selected Communities

Indicator	Suburban Express Bus	City of Sunrise	City of Plantation	City of Miramar	City of Hollywood	City of Ft Lauderdale
Residential Density (Units per Acre) 2013	5 to 10	3.2	2.7	2.0	3.6	3.8
Population Density (Per Acre) 2013	15 to 30	7.3	6.1	6.2	7.2	6.7
Employment Density (Jobs per Acre) 2013	2 to 5	2.3	5.1	2.3	2.8	5.7
Average Jobs/Housing Ratio	0.08	0.7	1.9	1.1	0.8	1.5

### Minimum Transit Benchmarks: Study Areas

Indicator	Suburban Express Bus	City of Sunrise	City of Plantation	City of Miramar	City of Hollywood	City of Ft Lauderdale
Residential Density (Units per Acre) 2013	5 to 10	2.5	4.6	2.2	6.6	1.6
Population Density (Per Acre) 2013	15 to 30	6.1	8.3	6.2	10.7	10.4
Employment Density (Jobs per Acre) 2013	2 to 5	3.9	1.0	1.0	4.7	24.1
Average Jobs/Housing Ratio	0.08	1.5	0.2	0.5	0.7	14.8

SOURCE: Esri, 2013; OnTheMap, 2011; 4ward Planning Inc., 2014



# Key Findings

## Socio-Economic Indicators

TOD research indicates that different types of households have different transit needs. Lower-income households are more likely to use public transit than higher-income households, which have more discretionary income, and are thus, more likely to own personal vehicles. As illustrated in the chart below, compared to Fort Lauderdale, Sunrise and Hollywood have higher shares of traditionally lower-wage employment (e.g. retail, health care, food service, and education) and households earning less than \$35k per year, but lower shares of zero-car households and rental housing.

### Minimum Transit Benchmarks: Selected Communities

Indicator	City of Sunrise	City of Plantation	City of Miramar	City of Hollywood	City of Ft Lauderdale
% of HHs Earnings <\$35K (2013)	34%	23%	23%	38%	35%
% of Units Rented (2013)	26%	31%	27%	36%	40%
% Zero-Car Households (ACS 2007-2011)*	7%	4%	3%	8%	8%
% Retail, Health Care, Food Service, and Educational Jobs (2013)	34%	72%	38%	44%	38%

### Minimum Transit Benchmarks: Study Areas

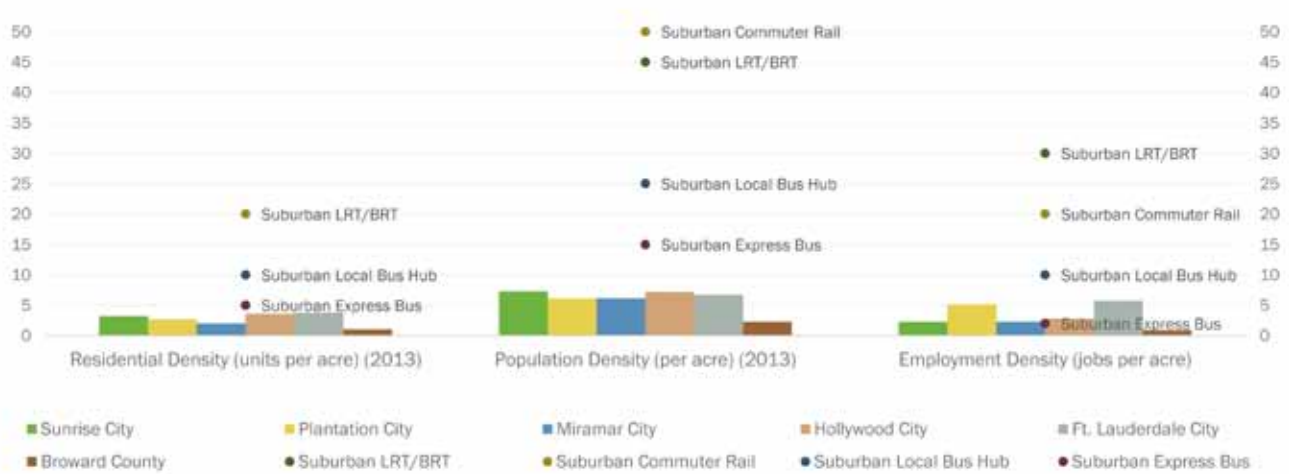
Indicator	City of Sunrise	City of Plantation	City of Miramar	City of Hollywood	City of Ft Lauderdale
% of HHs Earnings <\$35K (2013)	22%	26%	44%	64%	47%
% of Units Rented (2013)	63%	64%	21%	42%	71%
% Zero-Car Households (ACS 2007-2011)*	6%	1%	1%	29%	17%
% Retail, Health Care, Food Service, and Educational Jobs (2013)	40%	11%	40%	45%	27%

\*These figures contain large coefficients of variation, indicating that sampling error is large relative to the estimate, and are considered very unreliable.

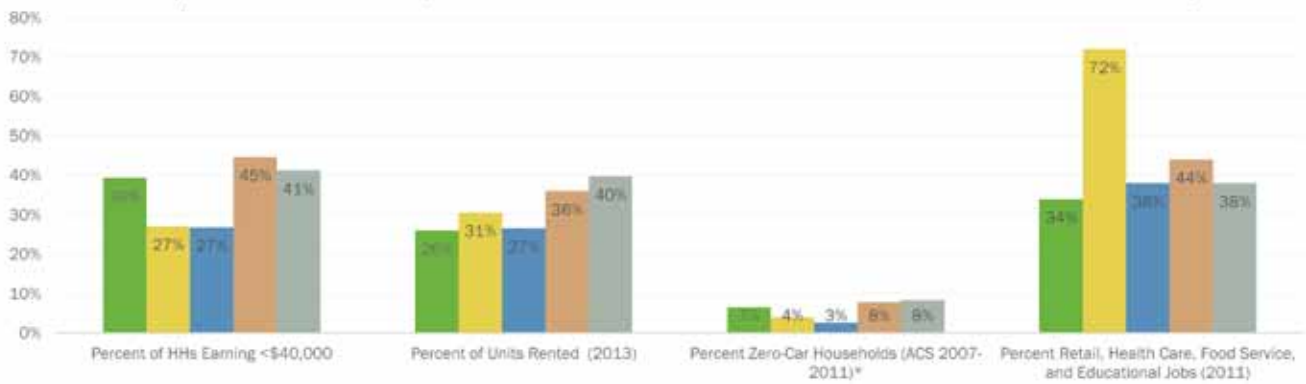
SOURCE: Esri, 2013; OnTheMap, 2011; 4ward Planning Inc., 2014

# Key Findings

## Minimum Transit Benchmarks























## Socio-Economic Indicators



SOURCE: Esri, 2013; OnTheMap, 2011; 4ward Planning Inc., 2014

# Key Findings

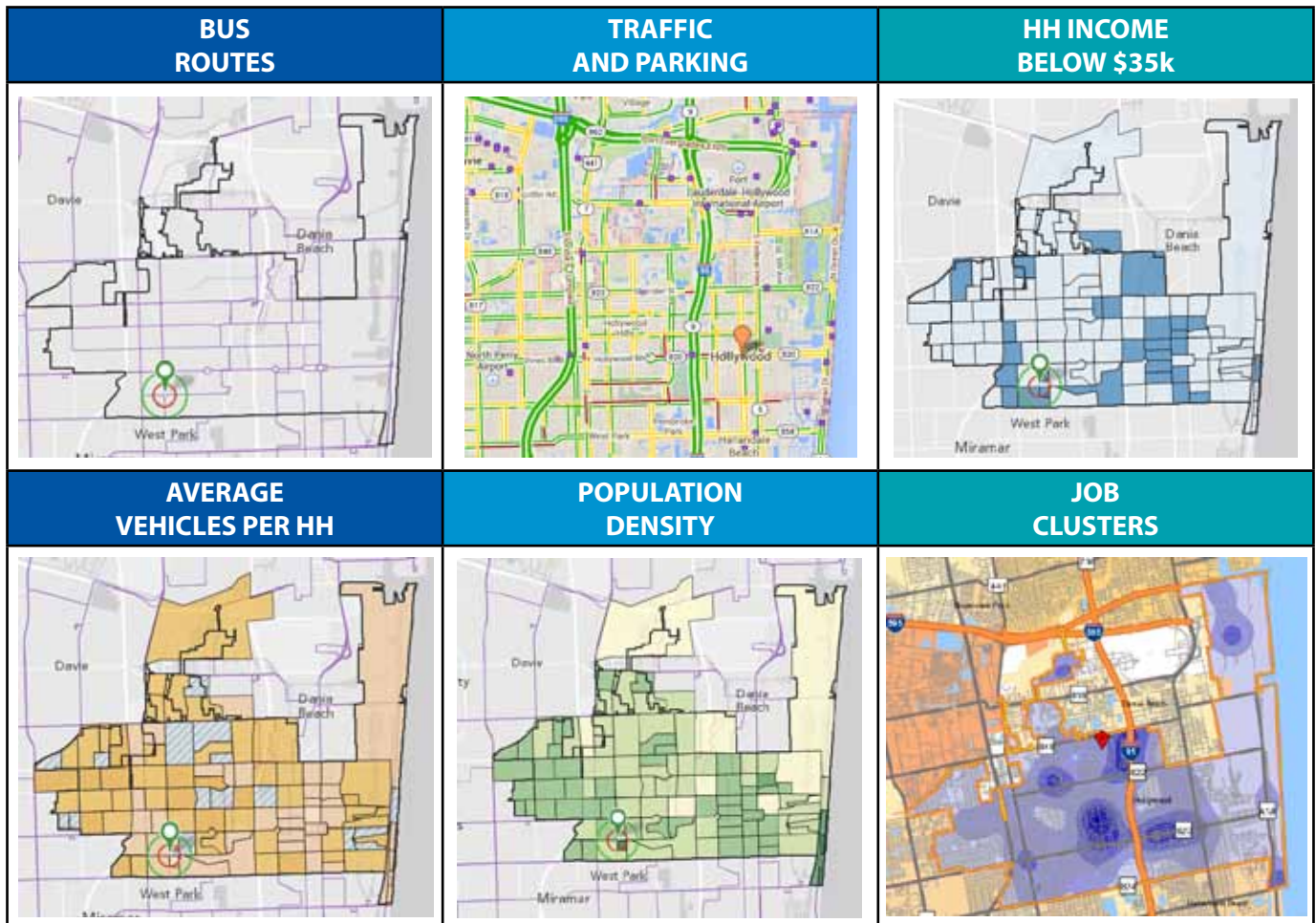
## Legend and Sources

BUS ROUTES	TRAFFIC AND PARKING	HH INCOME BELOW \$35k
<p>Bus Routes</p>  <p>Community Boundaries</p>  <p>SOURCE: Florida Transit Information System 2008</p>	<p>Monday 5:00pm <b>done</b> <span style="float:right">Slow Fast</span></p> <p><input type="radio"/> Live traffic</p> <p><input checked="" type="radio"/> Traffic at day and time:</p> <p>Day: <span>Monday</span></p> <p>Time: <span>8a 12p 5p</span></p> <p>(Data is estimated based on past conditions)</p> <p> Parking Facility</p> <p>SOURCE: Google Maps, 2014</p>	<p> \$35,000 or greater</p> <p> \$35,000 or less</p> <p>SOURCE: Esri, 2014</p>
AVERAGE VEHICLES PER HH	POPULATION DENSITY (per acre)	JOB CLUSTERS
<p> 2 or greater</p> <p> 1.5 to 1.9</p> <p> 1 to 1.4</p> <p> 1 or less</p> <p>SOURCE: ACS, Esri, 2014</p>	<p> 35 or greater</p> <p> 20 to 34</p> <p> 10 to 19</p> <p> 5 to 9</p> <p> 5 or less</p> <p>SOURCE: Esri, 2014</p>	<p> 5 - 3,486 Jobs/Sq.Mile</p> <p> 3,487 - 13,931 Jobs/Sq.Mile</p> <p> 13,932 - 31,338 Jobs/Sq.Mile</p> <p> 31,339 - 55,709 Jobs/Sq.Mile</p> <p> 55,710 - 87,043 Jobs/Sq.Mile</p> <p> Analysis Selection</p> <p>SOURCE: On The Map, 2011</p>

# Broward Communities

## Hollywood

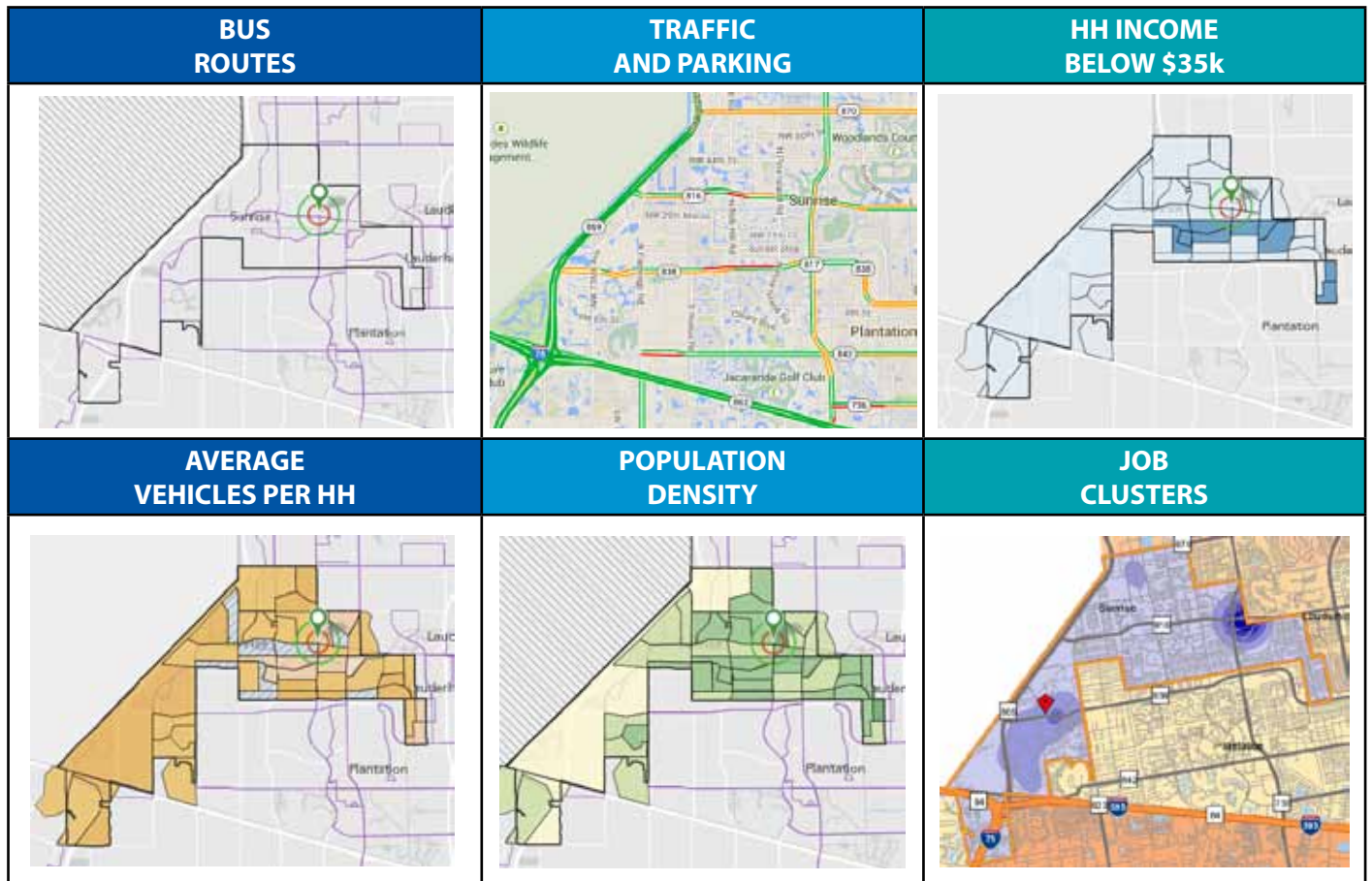
In Hollywood, peak-hour traffic is located near population and job clusters containing lower-income households. Since these clusters are somewhat separated, a circulator transit system may best serve lower-income households.



# Broward Communities

## Sunrise

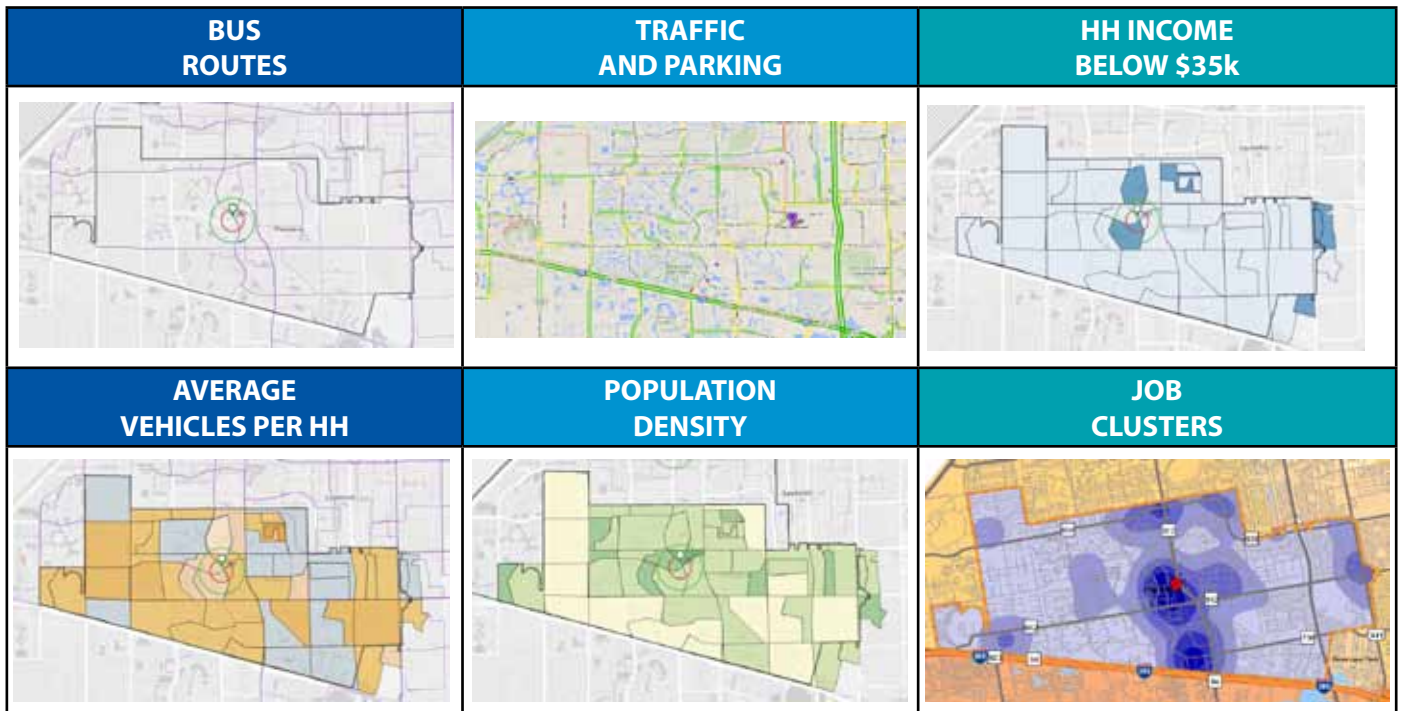
In Sunrise, population and job clusters are located near existing bus service, as well as households with lower income and average vehicle-ownership levels, suggesting support for increased transit service.



# Broward Communities

## Plantation

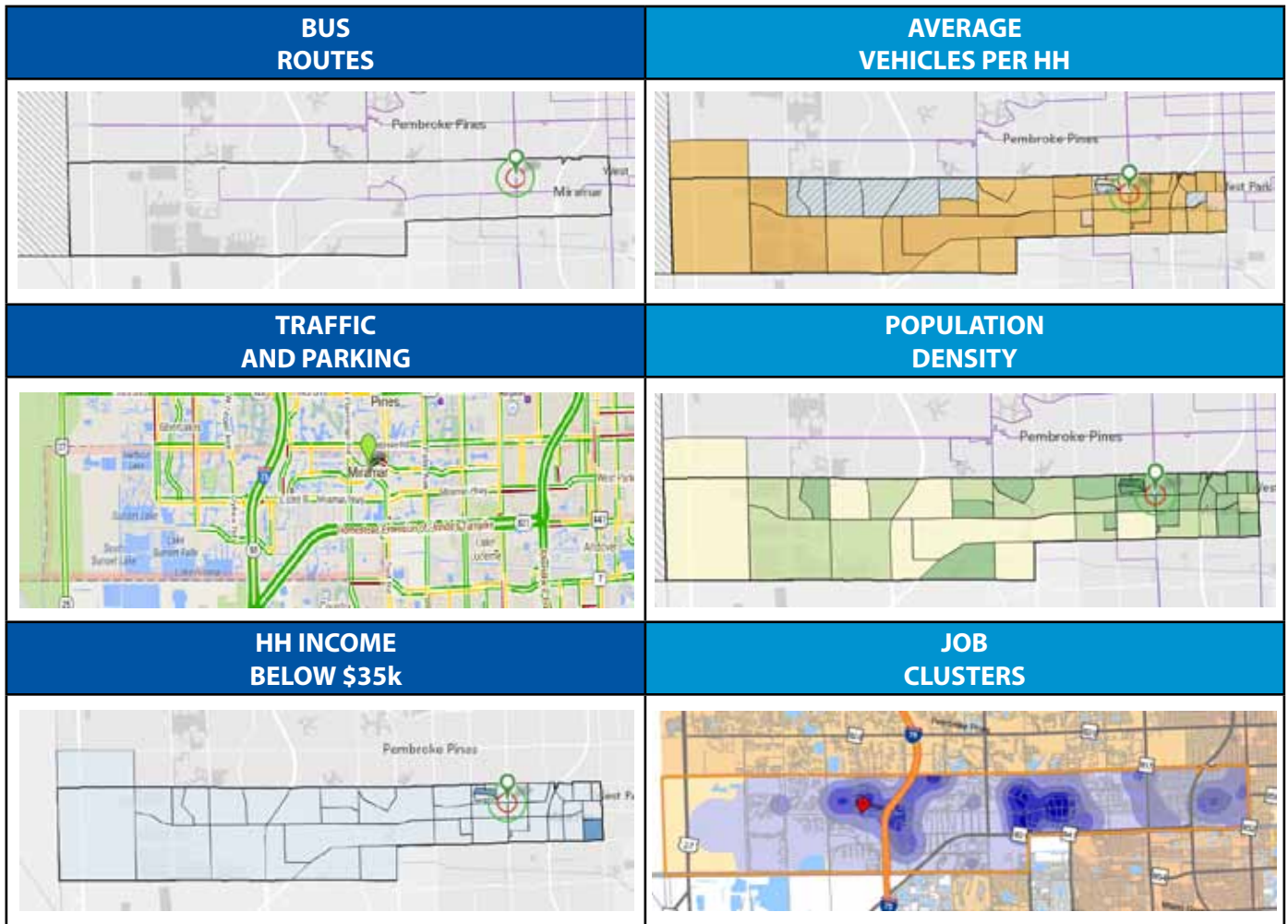
In Plantation, job clusters are located near existing corridors and bus routes, and households with lower income and average vehicle- ownership levels. Given little peak- hour traffic, increased transit service may be best targeted to lower-income households or those without personal vehicles.



# Broward Communities

## Miramar

In Miramar, population and traffic clusters are dispersed throughout the city, while job clusters are located near Interstate 75, north of Florida's Turnpike North - Homestead Extension (Florida 821) and along Miramar Parkway, which is served by existing bus routes. There are few clusters of low-income or zero-vehicle households.



# Takeaways

## Socio-Economic Trends: Broward Communities

TOD research indicates that low-income households are more likely to use public transit than higher-income households, which are more likely to use personal vehicles. In Miramar, Sunrise, Plantation, and Hollywood, workers earning \$1,250 or less per month represent nearly a quarter of employed persons, many of whom are employed in retail trade, health care, food service, and educational service industries - sectors traditionally providing lower wages. Further, workers employed within these areas, especially in Sunrise, would likely benefit from improved transit service and subsequent transportation savings.

As the working population of the selected communities and study areas largely reside in suburban spaces, each community should encourage construction of a wide range of market rate to affordable housing options close-in to transit. Such housing choice would better support new or expanded transit service (e.g., increased ridership), and entice private investment (e.g., transit-oriented development), as exemplified by the systems located in Memphis and Seattle.



**Sawgrass Mills Outlet Malls one of the largest retail outlets in Florida located in the City of Sunrise**



# Benefit Transfer Analysis

## Reducing the Number of Autos:

### Key Findings

#### Wave Streetcar Route

The employment centers along the Wave Streetcar route generate 25,000 cars on Fort Lauderdale's streets during commuting periods. As there is ample parking on the northern part of the route, some drivers may consider leaving their cars if they work in the southern route.

#### Central Broward East-West Transit route: 3,036 fewer vehicles

For those that live to the north of the CBT route route, there is an incentive to park at the Tri-Rail station and ride to centers of employment, avoiding potential gridlock downtown. In our best-case scenario, 3,036 fewer cars would drive through downtown Fort Lauderdale during peak traffic hours. However, due to the location of parking lots and employment centers, those who live south of the route have little incentive to park their cars and ride the streetcar.

#### Broward County: 1% reduction = 87,300 less cars on the road each day

Broward County area workers, overwhelmingly, commute by automobile (90 percent), resulting in traffic congestion during peak hours. Even a one-percent reduction in auto use within Broward County would remove nearly 87,300 cars from the road per day, resulting in reduced auto congestion and \$7.2 to \$11.1 million in annual travel-time savings for selected communities.



Monitoring traffic flow at the Broward County/FDOT Regional Transportation Management Center

# Background

## How Do Broward Residents Get to Work?

How many fewer personal vehicles do we expect to see in downtown Fort Lauderdale after the Wave Streetcar route is built, or after it is expanded? Currently, Broward County area workers, overwhelmingly, commute by driving alone - creating congestion and parking issues, and lengthening the commute times for most workers. To assess how many vehicles are on the road as a result of employment centers located along the Wave Streetcar route, we have incorporated the number of commuters, their points of origin (provided via OnTheMap, a US Census commuting vitalization tool), and the means by which they commute (provided via ESRI and based on Census survey data) to support a comprehensive analysis.

- **Wave Streetcar Route:** 1,539 workers use public transit, and 27,495 workers commute in approximately 24,486 vehicles (some carpooling exists) to job sites along the Wave Streetcar route. The remainder walk, bike, or work from home. As far more vehicles pass through downtown Fort Lauderdale during peak hours, these figures do not include the number of vehicles that pass through the area to commute to other locations.
- **Central Broward East-West Transit Route:** 1,918 workers who work within 1,000 feet of this proposed route use public transit to commute, and another 55,184 workers commute in approximately 52,438 vehicles (some carpooling exists). The remainder walk, bike, or work from home. Vehicles that pass through, but do not start or stop in the study area, are not counted.



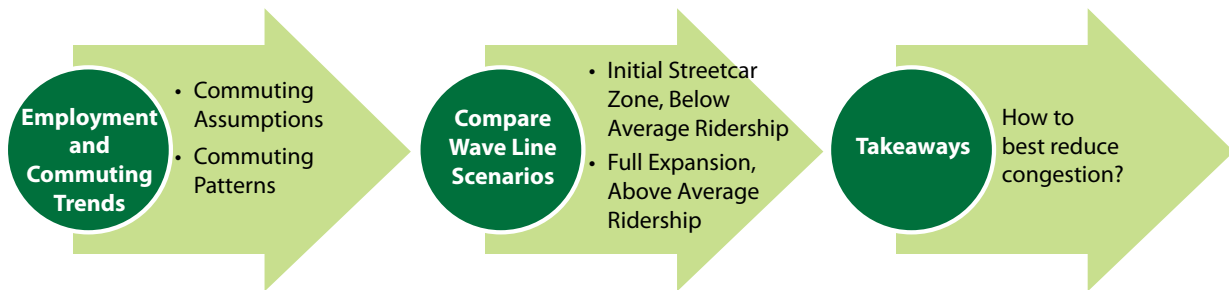
**Typical traffic commute in Fort Lauderdale**

SOURCE: Esri; Sungjun Park, UC Berkley; OnTheMap

# Methodology

## Reducing the Number of Autos

The following section of this report compares the number of expected vehicles driving on the downtown streets of Fort Lauderdale for both the Wave Streetcar Zone and the Full Wave Expansion scenario during peak commuting hours; it does not look at congestion of connecting highways. Using OnTheMap, we charted key employment and housing centers along the Wave Streetcar route, to calculate how many vehicles are in use on both the initial two-mile alignment and on the full expansion to the airport, South Florida Education Center, and two Tri-Rail stations (For Lauderdale and Fort Lauderdale/Hollywood International Airport). ESRI data, which identifies commutation mode within Broward County, and OnTheMap, which provides the distance and direction traveled for commuting to work, were employed to calculate the number of cars on the arterials within 1,000 feet of the streetcar route. This section focuses on reduction of cars along the north-south route (except the area between the Education Center and the airport). It does not examine east-west commuting patterns that pass over the route within downtown Fort Lauderdale.



# Methodology

## How Many Might Use the Streetcar?

In cities with light rail and streetcars, the number of people who use these modes of transit falls between two - and nine-percent, with the national average slightly above four-percent. Due to the location of parking and station route (illustrated on the map on the following pages and elaborated below), we assume average ridership on the Wave Streetcar route, and higher-than-average ridership on the proposed Central Broward East-West Transit alignment.

- **Wave Streetcar Route:** *National average ridership assumed from short track and ample parking choices near employment.* We assume that an average number (two scenarios of one - and three-percent of drivers who travel from the north) who do not live within 1,000 feet of the streetcar will use it to complete their commute, due to the location of major parking lots along the initial route.
- **Central Broward East-West Transit Route:** *Above national average ridership assumed from longer track and gridlock-avoiding park-and-ride option.* We assume best-case scenarios, where some workers who drive (two scenarios of five - and seven-percent) who do not live within 1,000 feet, but live north of the streetcar route will choose to park their car at the TriRail station and take the streetcar, due to its available parking and proximity to the highway. We further assume that those living to the south will still drive, as they either work at one of the two southern station stops (the Education Center or the airport) or will not park at the airport to switch to the streetcar (as airport parking is expensive, and parking facilities exist near other key employment centers).

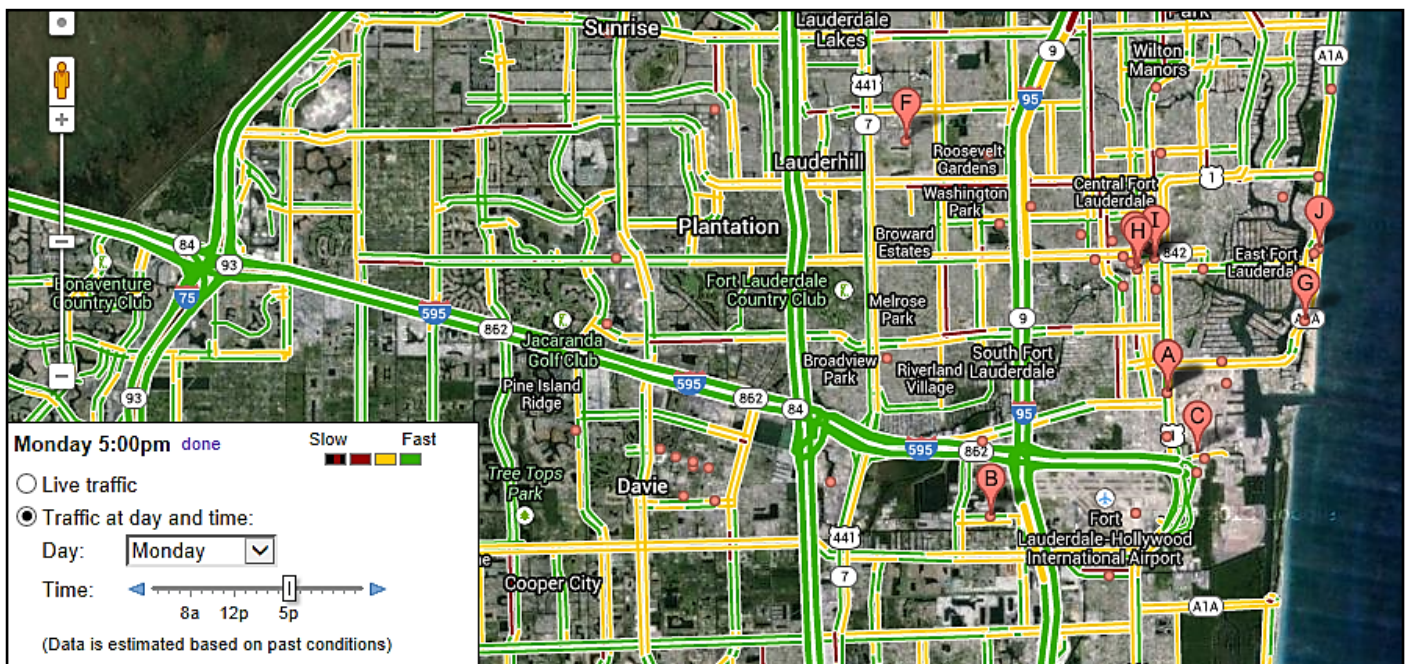


People boarding a Modern Streetcar

# Background

## Traffic and Parking

The map below displays the location of parking garages (in red markers) and peak hour traffic patterns (Monday, 5pm) for Fort Lauderdale, as reported by Google maps. Areas in green illustrate areas where traffic flows well, and areas in red indicate slower driving zones where auto congestion is likely.



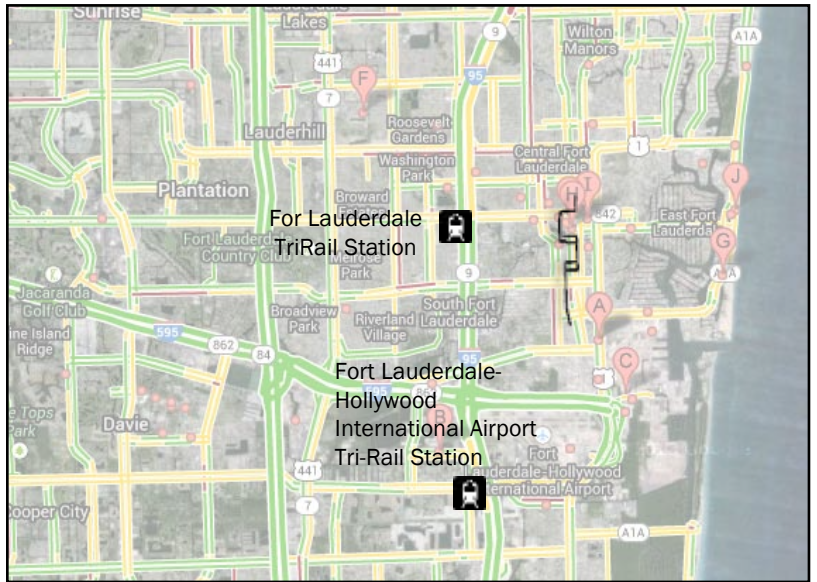
SOURCE: Google Maps, April 2014

# Wave Streetcar Route

## Reducing the Number of Autos

Along the Wave Streetcar route, parking is available at the locations marked with red dots (large and small) on the map located to the right.

As there is ample parking on the northern part of the route, some drivers may consider leaving their cars if they work in the southern route. Some who commute by walking or bike riding may find the streetcar to be a better means of getting to work, although this will not reduce vehicles on the roads.



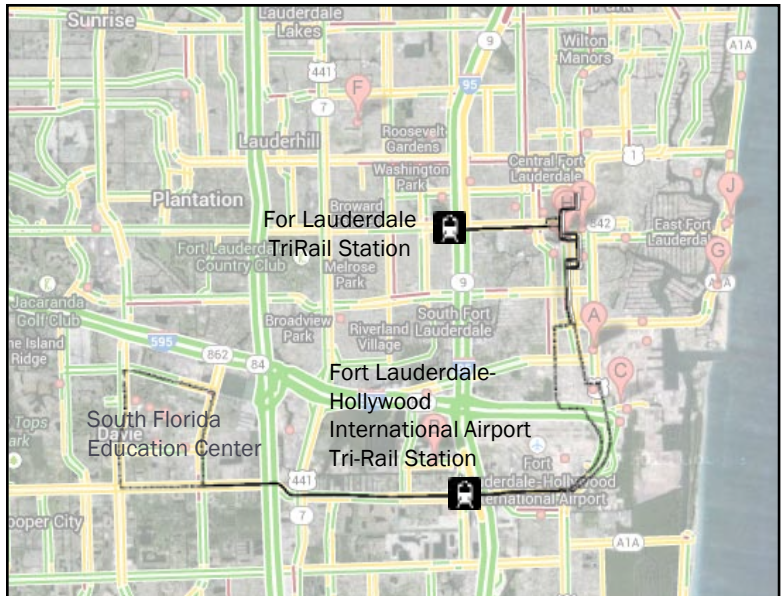
	Cars On Road	Travel by Public Transit	Travel by Other
No Streetcar	24,487	1,539	5,947
1% Reduction of Cars for those from North	24,317	2,303	5,352
3% Reduction of Cars for those from North	23,978	2,643	5,352

SOURCE: ESRI, OnTheMap, Google Earth

# Central Broward East-West Transit Route

## Reducing the Number of Autos

Ample parking is available along the Full CBT route route, at the three furthest points (the Tri-Rail, Fort Lauderdale-Hollywood International Airport, and the South Florida Education Center). However, those coming from the south will either be working at the airport and education center (and park there), or work in the northernmost section of the alignment and park in the north, as before. Residents who work along the route and live north of the route have a stronger incentive to park at the Broward Boulevard Tri-Rail station and take the streetcar south to their place of employment, to avoid downtown traffic. Residents inside the 1,000-foot zone also have a stronger incentive to use the streetcar; and some who walk or ride their bike may also switch to public transit, although this will not reduce road congestion.



	Cars On Road	Travel by Public Transit	Travel by Other
No Streetcar	52,438	1,919	8,536
5% Reduction of Cars for those from North	50,269	4,941	7,682
7% Reduction of Cars for those from North	49,402	5,809	7,682

SOURCE: ESRI, OnTheMap, Google Earth

# Broward Communities

## Reduced Auto Usage Saves Money, Too

The Public Transit User's Association estimates that the per-capita yearly savings for the availability of a bus system is slightly less than \$50, and that of a small rail system is \$100, even if individuals do not use the system or use it only sporadically. Those that use public transit see savings in reduced gas spending, parking, and automotive maintenance; and the remainder (those that continue to drive because the car is more convenient, or park-and-ride is not an option, given their home and employment locations) see savings in the form of shorter, more efficient commutes, which also leads to less gasoline consumption and car maintenance.

While this \$50 to \$100 per-capita savings may be high for Broward (the Wave Streetcar route is not door-to-door for most commuters and, thus, requires some amount of fuel and parking expenditures), even a \$10 per-capita savings for those who work within 1,000 feet of the proposed Central Broward East-West Transit route alignment would lead to more than \$500,000 in annual estimated savings (\$656,400 saved collectively, annually, by those who work along the route).

Further, much of what would be saved in avoided fuel and parking costs would be spent in the local economy.

SOURCE: The Public Transit User's Association



# Takeways

## Reducing the Number of Autos

- Due to the current Wave alignment's relatively short length, the likely ridership for the current streetcar alignment would consist of people who live nearby or already use public transit, walk, or bike to work.
- The majority of those who commute into Fort Lauderdale do so from the north and west (identified as 69 percent of commuters associated with the current alignment and 79 percent of commuters associated with the proposed extended alignment), and drive alone. Along the proposed extended alignment, providing a park-and-ride facility would offer strong incentive to utilize transit, for those who currently drive to work downtown, at the airport, and Education Center.

# Broward Communities

## Reducing the Number of Autos and Carbon Emissions Avoided

Broward County area workers, overwhelmingly, commute by automobile (90 percent), a significant source of carbon dioxide (CO<sub>2</sub>) emissions. Even a one-percent reduction of auto use within Broward County, represented by the removal of nearly 87,300 cars from the road per day, would save nearly \$2.5 billion in annual automobile costs and eliminate over 7,400 tons of CO<sub>2</sub> per year. Although these estimates vary by community, they have substantial regional impacts on traffic congestion, household savings, consumer spending, and environmental quality.

### Reduced Auto Congestion and Carbon Emissions Avoided

	City of Sunrise	City of Plantation	City of Miramar	City of Hollywood	Broward County
Commute by Car (Alone or carpool)	38,943	40,341	51,543	57,874	740,410
Percent Total	93%	92%	93%	87%	90%
1% Reduction of Cars	4,591	4,756	6,077	6,823	87,294
3% Reduction of Cars	12,236	12,959	16,313	18,388	233,814
Reduction of Vehicle Miles <sup>1</sup>	\$185	\$192	\$245	\$275	\$3,520
Reduction of Vehicle Miles <sup>1</sup>	\$493	\$523	\$658	\$741	\$9,428
Reduction of Automobile Costs (million) <sup>2</sup>	\$131	\$136	\$174	\$195	\$2,495
Reduction of Automobile Costs (million) <sup>2</sup>	\$958,043	\$1,014,679	\$1,277,308	\$1,439,765	\$18,307,671
Reduction in tons of CO <sub>2</sub> per year <sup>3,4</sup>	389	403	515	579	7,404
Reduction in tons of CO <sub>2</sub> per year <sup>3,4</sup>	1,038	1,099	1,384	1,560	19,832

<sup>1</sup> Average of 11.79 miles per vehicle per day based on estimates from the Federal Highway Administration.

<sup>2</sup> Based on data provided by AAA, for the average sedan, the true cost of auto ownership is 78.3 per mile assuming 10,000 miles per year.

<sup>3</sup> Assumes 19.4 pounds of CO<sub>2</sub> per gallon of gasoline according to EPA.

<sup>4</sup> Assumes an estimated average fuel efficiency of 24.8 miles per gallon, according to the University of Michigan Transportation Research Institute.

SOURCE: ACS Population Summary, 2007-2011; 4ward Planning Inc., 2014

# Carbon Emissions Avoided

## Key Findings:

### **Wave Streetcar: 4,256 less tons of CO2 per year**

Status quo automobile usage would continue to produce over 4,800 tons of CO2 per year. Assuming 350 operating days per year, the current Wave alignment service is projected to produce less than 150 tons of CO2 annually, over 4,650 tons less than status quo automobile usage.

### **Full CBT route: 3,344 less tons of CO2 per year**

This equates to a difference of 3,344 tons per year if the Wave Streetcar is extended. This analysis looks at operating emissions only, additional carbon emissions would likely be avoided from persons choosing to commute via transit rather than automobile, as a result of improved transit service.

### **Broward County: 1% Reduction = 7,400 less tons of CO2 per year**

Broward County area workers, overwhelmingly, commute by automobile (90 percent), a significant source of carbon dioxide (CO2) emissions. Even a one-percent reduction in auto use within Broward County, represented by the removal of nearly 87,300 cars from the road per day, would eliminate over 7,400 tons of CO2 per year.

# Methodology

## Carbon Dioxide Emission Assumptions

In modeling scenarios associated with CO2 emissions from the Wave Streetcar route, the Central Broward East-West Transit route scenario, and the continuation of status quo automobile usage, the following assumptions were made:

METRIC	WAVE STREETCAR	FULL CBT ROUTE	AUTOMOBILE
Miles/Vehicles/Day	312	312	11.79
Average Vehicles/ Day	4	12	2,994
Passenger Miles per Gallon	120.5	120.5	24.8

Assumptions for the Wave are based on an average streetcar speed of 13 miles per hour (312 miles/vehicle/day) with operations of 24 hours and 350 days per year, making the CO2 output a higher estimate than would occur under operations of less than 24 hours. The passenger miles per gallon is based on data from the American Bus Association. Four streetcars were assumed to be in operation at all times for the current Wave alignment analysis, with a linear increase in streetcars per mile for the CBT route.

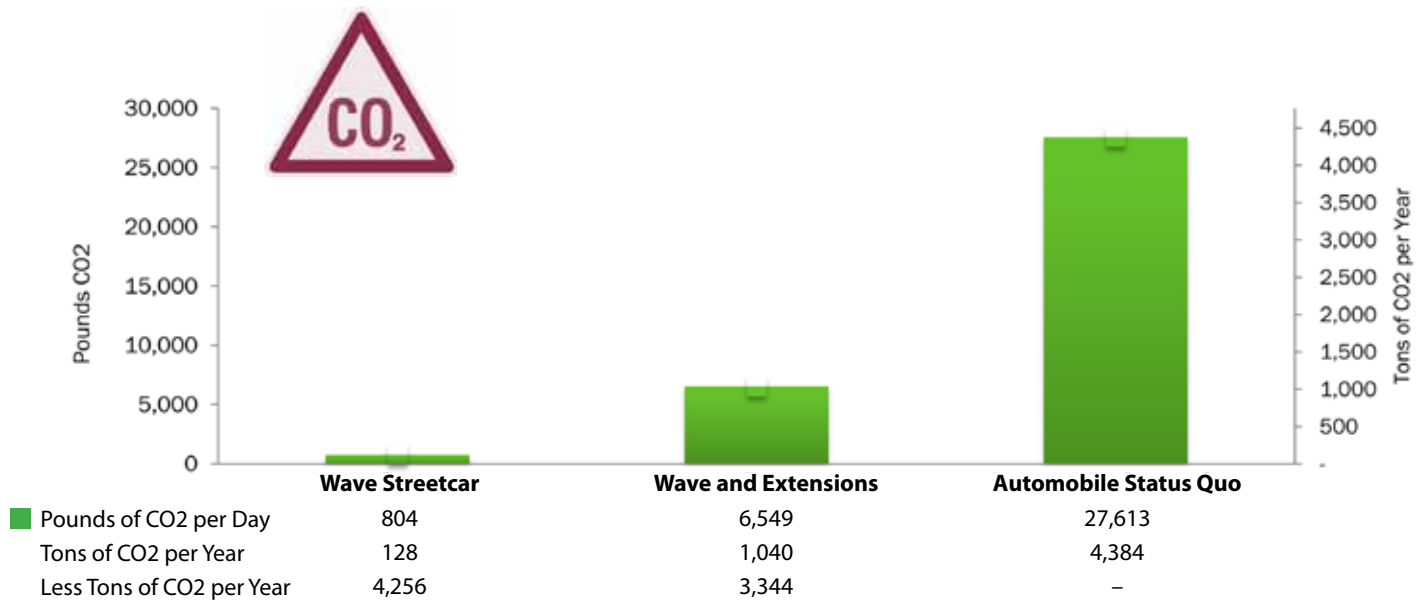
**Assumptions for the automobile scenario are based the following :**

An average of 11.79 miles per vehicle per day was assumed based on estimates from the Federal Highway Administration. The average of 2,994 vehicles per day is based on the American Community Survey estimates of workers who drive alone as a means to works within a quarter-mile radius of the Wave line. The miles-per-gallon of 24.8 is an estimated average fuel efficiency for year 2013 according to the University of Michigan Transportation Research Institute.

# Carbon Dioxide Emissions

## Takeaway:

Looking specifically at the carbon dioxide emissions created from transit and automobile operations, continued status quo automobile usage produces significantly more CO<sub>2</sub> per day than both the Wave and CBT routes. Assuming 350 operating days per year, the Wave Streetcar route is estimated to produce 128 tons of CO<sub>2</sub> per year, while status quo automobile usage would continue to produce 4,384 tons of CO<sub>2</sub> per year. This equates to a difference of 4,256 less tons per year under the Wave Streetcar scenario and 3,344 tons per year if the Wave Streetcar is extended. This analysis looks at operating emissions only, additional carbon emissions would likely be avoided from persons choosing to commute via transit rather than automobile, as a result of improved transit service.



# Travel Time Value

## Key Findings:

### **Wave Streetcar Route: \$6,840 savings per day for each trip**

Given assumptions on hourly time value, average mile and price per gallon in Fort Lauderdale, average travel speeds, and ridership by mode, the Wave Streetcar route would cost \$12,881 per day per trip, while each automobile trip (status quo) would cost \$19,721 per day. This difference in aggregate daily travel time costs amounts to a savings of \$6,840 per trip, if streetcar transit were substituted for auto travel.

### **Wave Streetcar Route: \$2.6 million in potential savings per year**

Compared to automobile use (status quo), the Wave Streetcar route would result in an annual total travel time cost savings of nearly \$2.6 million, compared to \$352,080 for regular bus service and \$3.4 million for BRT.

### **Extension Scenarios: Savings Increases with each additional mile or trip**

Further, the relationship between travel time cost savings would be greater under the proposed CBT route, as the number of daily trips and miles traveled would increase with improved transit service. As a result, the Wave Streetcar (both the current alignment and the proposed alignment) is likely to result in significant time value savings for Broward County residents and workers.

### **Broward County: \$88.1 to \$176 million dollars in annual travel-time savings**

With the average travel time to work just over 27 minutes within Broward County, a five to ten percent reduction in average travel time for each work trip could result in between \$88.1 to \$176 million dollars in annual travel-time savings for Broward County commuters.

# Travel Time Value

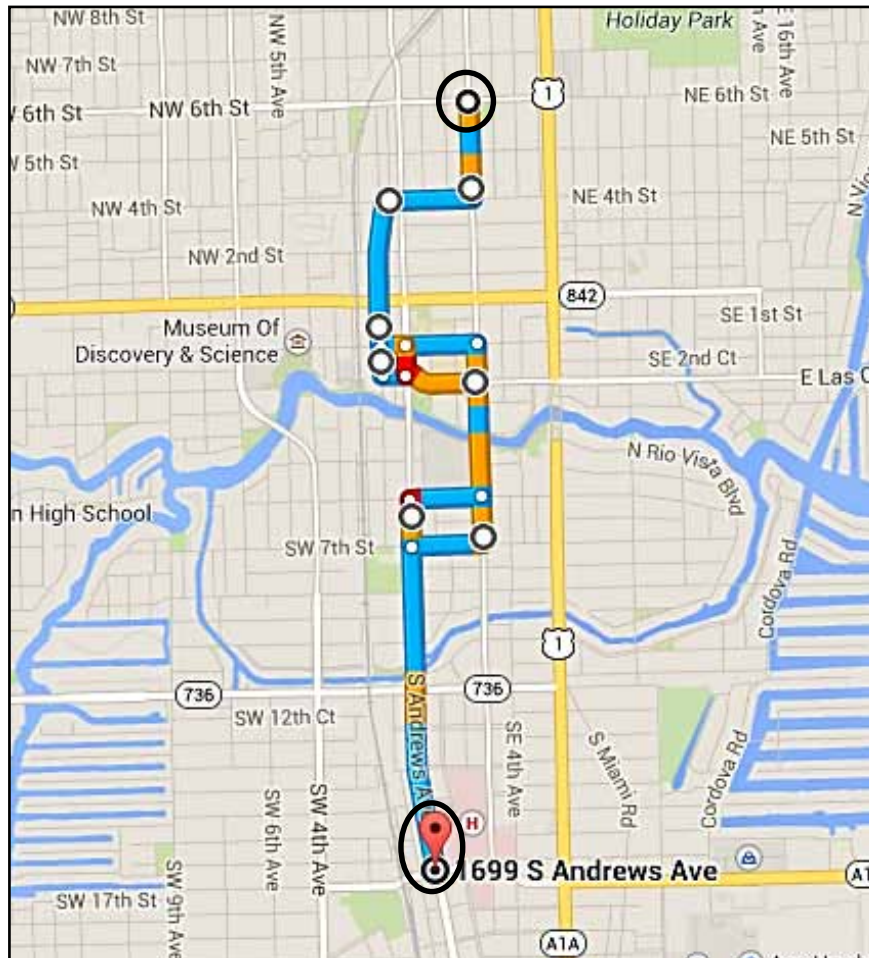
## Methodology:

The estimated travel time value and total value (time + marginal monetary cost per ride) of the following transit modes was modeled: the Wave Streetcar route, a bus, an automobile, bus rapid transit (BRT), cycling, and walking.

Time values were determined for each travel mode based on the following assumptions and sources:

- Hourly time value estimates by mode, adjusted for inflation (US Department of Transportation, Inflationdata.com)
- Distance and travel time by mode (Google Maps)
- Average mile and price per gallon in Fort Lauderdale (Federal Highway Administration)
- Average travel speeds for BRT (Victoria Transport Policy Institute)

$$\text{Travel Time Value} = \text{Time} + \$ \text{ Per Ride}$$



# Travel Time Value

## Concepts and Assumptions:

According to the **Victoria Transport Policy Institute**, travel time is one of the largest costs of transportation, and travel time savings can function as a crucial justification for transportation infrastructure improvements. Total travel time costs are the product of time spent traveling (measured in minutes or hours) multiplied by unit costs (measured in monetary cost per trip, for this analysis). The following pages will analyze total travel time costs at the individual and aggregate level, the latter which assumes a daily ridership of 3,211 for the Wave Streetcar route.

### Hourly Time Value

LOW ESTIMATE	MEDIUM ESTIMATE	HIGH ESTIMATE
\$9.28	\$12.91	\$15.52

SOURCE: US DOT "The Value of Saving Travel Time," adjusted for inflation in 2014 dollars

MODE	TIME ASSUMPTION PER TRIP	COST ASSUMPTION PER TRIP
Wave	14 minutes	\$1
Bus	19 minutes	\$1.75
Automobile	14 minutes	\$78.3 cents/mile*
BRT	7 minutes**	\$1.75
Bicycle	12 minutes	N/A
Walk	43 minutes	N/A

\*Based on a composite average determined by 2013 AAA report entitled Your Driving Costs

\*\* Based on average travel speeds according to the Victoria Transport Policy Institute



# Results by Transit Mode

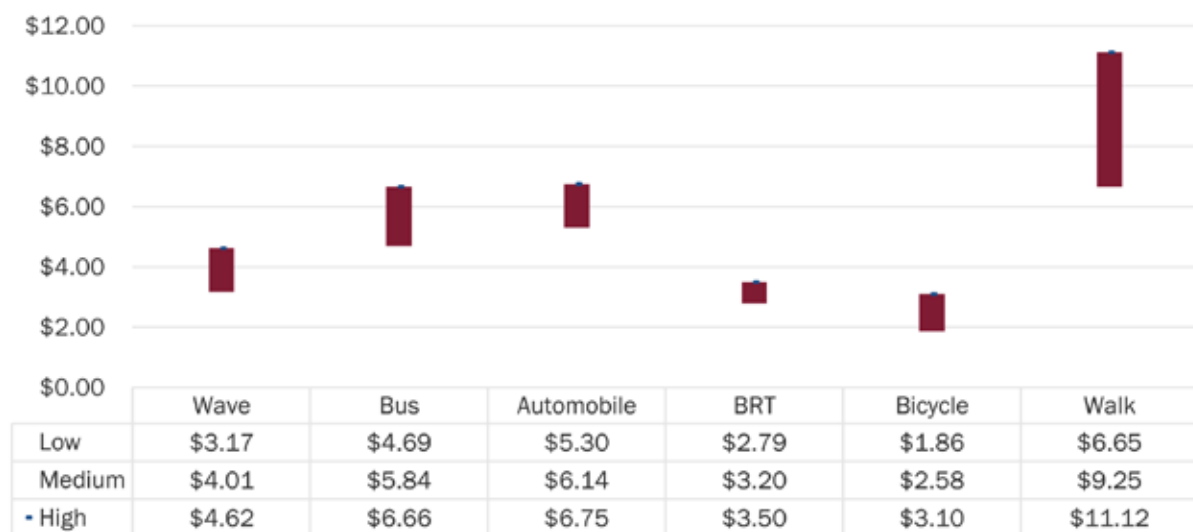
## Individual Travel time Value:

While the Wave Streetcar route shows a similar time value as auto transit, it exhibits a lower total value than automobiles, as well as traditional buses. The mode having the lowest estimated time and total value is BRT. Unsurprisingly, walking is characterized by the greatest time value by a significant margin.

**Time Value by Transit Mode**



**Total Value by Transit Mode**



# Results by Transit Mode\*

## Aggregate Travel Time Value:

**Wave Results**

**Time Value Per Trip**

\$2.17	\$3.01	\$3.62
--------	--------	--------

**Total Travel Time Cost/Day Estimates**

Low Estimate	Medium Estimate	High Estimate
\$6,953	\$9,670	\$11,625

Average \$9,416.66

**Total Value per Trip (Time+Money)**

\$3.17	\$4.01	\$4.62
--------	--------	--------

**Total Cost/Day Estimates**

Low Estimate	Medium Estimate	High Estimate
\$10,165	\$12,881	\$14,837

**Bus Results**

**Time Value Per Trip**

\$2.94	\$4.09	\$4.91
--------	--------	--------

**Total Travel Time Cost/Day Estimates**

Low Estimate	Medium Estimate	High Estimate
\$9,437	\$13,123	\$15,778

Average \$12,779.76

**Total Value per Trip (Time+Money)**

\$4.69	\$5.84	\$6.66
--------	--------	--------

**Total Cost/Day Estimates**

Low Estimate	Medium Estimate	High Estimate
\$15,057	\$18,743	\$21,397

**Automobile Results (Status Quo)**

**Time Value Per Trip**

\$2.17	\$3.01	\$3.62
--------	--------	--------

**Total Travel Time Cost/Day Estimates**

Low Estimate	Medium Estimate	High Estimate
\$6,953	\$9,670	\$11,625

Average \$9,416.66

**Total Value per Trip (Time+Money)**

\$5.30	\$6.14	\$6.75
--------	--------	--------

**Total Cost/Day Estimates**

Low Estimate	Medium Estimate	High Estimate
\$17,004	\$19,721	\$21,676

**BRT Results**

**Time Value Per Trip**

\$1.04	\$1.45	\$1.75
--------	--------	--------

**Total Travel Time Cost/Day Estimates**

Low Estimate	Medium Estimate	High Estimate
\$3,352	\$4,662	\$5,605

Average \$4,540.18

**Total Value per Trip (Time+Money)**

\$2.79	\$3.20	\$3.50
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**Total Cost/Day Estimates**

Low Estimate	Medium Estimate	High Estimate
\$8,972	\$10,282	\$11,225

**Bicycle Results**

**Time Value Per Trip**

\$1.86	\$2.58	\$3.10
--------	--------	--------

**Total Travel Time Cost/Day Estimates**

Low Estimate	Medium Estimate	High Estimate
\$5,960	\$8,288	\$9,965

Average \$8,071.43

**Total Value per Trip (Time+Money)**

\$1.86	\$2.58	\$3.10
--------	--------	--------

**Total Cost/Day Estimates**

Low Estimate	Medium Estimate	High Estimate
\$5,960	\$8,289	\$9,965

**Walking Results**

**Time Value Per Trip**

\$6.65	\$9.25	\$11.12
--------	--------	---------

**Total Travel Time Cost/Day Estimates**

Low Estimate	Medium Estimate	High Estimate
\$21,358	\$29,701	\$35,708

Average \$28,922.61

**Total Value per Trip (Time+Money)**

\$6.65	\$9.25	\$11.12
--------	--------	---------

**Total Cost/Day Estimates**

Low Estimate	Medium Estimate	High Estimate
\$21,358	\$29,701	\$35,708

\*Assumes a daily ridership of 3,211, as projected by Parsons Brinckerhoff, for each mode to determine total costs

# Travel Time Value

## Understanding Travel Costs

Travel time value, a non-market economic value concept, can be difficult to understand. One way to think about time value is to ask: "Which mode of transport would Broward County commuters choose?"

The time value model demonstrates the following:

WAVE	BUS	AUTOMOBILE (Status Quo)
3,211 Riders	3,211 Riders	3,211 Riders
14 minute/trip	19 minute/trip	14 minute/trip
Time Value/Trip \$3.01	Time Value/Trip \$4.09	Time Value/Trip \$3.01
<b>Total Value/Trip: \$4.01</b>	<b>Total Value/Trip: \$5.84</b>	<b>Total Value/Trip: \$6.14</b>
Aggregate Daily Travel Time Cost: \$12,881	Aggregate Daily Travel Time Cost: \$18,743	Aggregate Daily Travel Time Cost: \$19,721
BRT	BICYCLE	WALKING
3,211 Riders	3,211 Riders	3,211 Riders
7 minute/trip	12 minute/trip	43 minute/trip
Time Value/Trip \$3.20	Time Value/Trip \$2.58	Time Value/Trip \$9.25
<b>Total Value/Trip: \$3.20</b>	<b>Total Value/Trip: \$2.58</b>	<b>Total Value/Trip: \$9.25</b>
Aggregate Daily Travel Time Cost: \$10,275	Aggregate Daily Travel Time Cost: \$8,284	Aggregate Daily Travel Time Cost: \$29,702

# Travel Time Value

## Takeaways:

Assuming 3,211 daily riders for each mode at 360 days per year, the figure below illustrates that the annual total travel time costs range from nearly \$3.0 million for a bicycle and nearly \$10.7 million for walking. A lower number indicates less travel time costs for residents (and more time for additional leisure and/or work) relative to a higher number. Compared to automobile use (status quo), the Wave Streetcar route would result in an annual total travel time cost savings of nearly \$2.6 million, compared to \$352,080 for regular bus service and \$3.4 million for BRT. Further, the relationship between travel time cost savings would be greater under the CBT route. As a result, the Wave Streetcar route is likely to result in significant time value savings for Broward County residents and workers.

### Aggregate Annual Travel Time Value by Transit Mode

WAVE	BUS	AUTOMOBILE	BRT	BICYCLE	WALKING
\$4,421,160	\$6,747,480	\$7,099,560	\$3,699,072	\$2,982,377	\$10,692,630

### Aggregate Annual Travel Time Value Difference from Automobile

WAVE	BUS	AUTOMOBILE	BRT	BICYCLE	WALKING
\$(2,678,400)	\$(352,080)	-	\$(3,400,488)	\$(4,117,183)	\$3,593,070

# Travel Time Value

## Costs Savings

With the average travel time to work just over 27 minutes within Broward County, a mere five-percent reduction in average travel time for each work trip (just under one-and-a-half minutes each way) could result in \$88.1 million dollars in annual travel-time savings. A ten percent reduction in aggregate travel time to work (nearly three minutes) could result in between \$176 million dollars in annual travel-time savings for Broward County commuters.

### Travel Time Cost Savings

	City of Sunrise	City of Plantation	City of Miramar	City of Hollywood	Broward County
Total Commuters (Exclude work from home)	41,592	42,375	54,849	67,208	813,714
Average Travel Time to Work (in minutes)	27.9	25.3	30.1	27.3	26.9
5% Reduction of Travel Time (minutes)	1.4	1.3	1.5	1.4	1.3
10% Reduction of Travel Time (minutes)	2.8	2.5	3.0	2.7	2.7
5% Aggregate Daily Travel Time Savings	\$8,989	\$8,304	\$12,788	\$14,212	\$169,550
10% Aggregate Daily Travel Time Savings	\$17,977	\$16,609	\$25,576	\$28,424	\$339,100
Annual Travel Time Savings	\$4,674,026	\$4,318,246	\$6,649,857	\$7,390,277	\$88,166,006
Annual Travel Time Savings	\$9,348,052	\$8,636,491	\$13,299,714	\$14,780,554	\$176,332,013

<sup>1</sup>Hourly time value of \$12.91 per hour based on US DOT "The Value of Saving Travel Time," adjusted for inflation in 2014 dollars

<sup>2</sup>Assumes 2 work trips per day, 52 work weeks per year.

# Transportation Costs

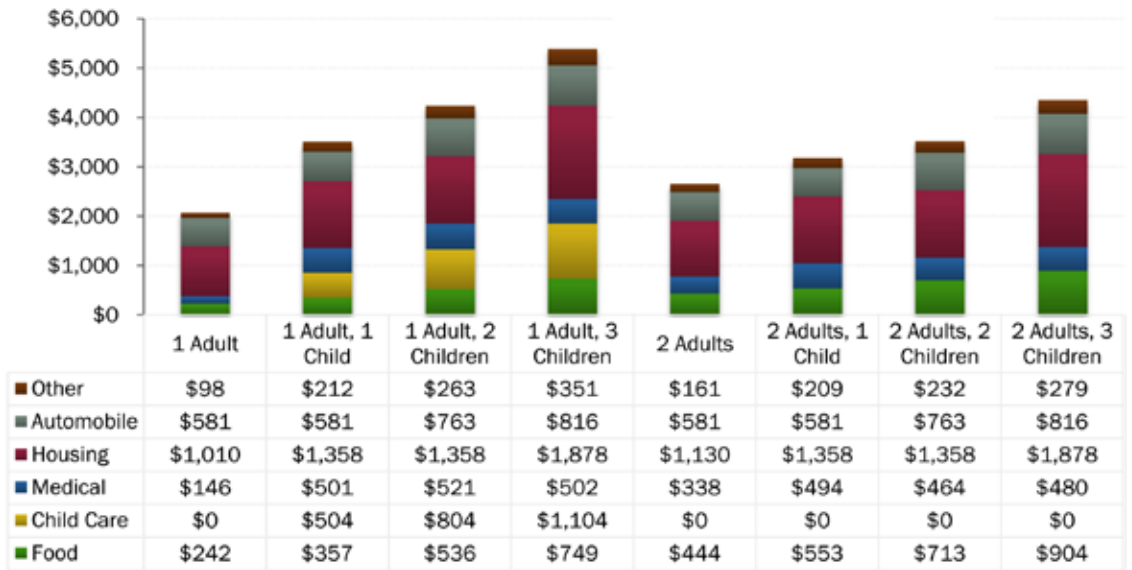
## Living Wage:

Based on monthly expense data provided by the MIT Living Wage Calculator and vehicle cost estimates provided by AAA, a sole provider working full time (2,080 hours per year) in Broward County must earn between \$2,149 and \$5,284 per month (\$27.9k and \$72.5k per year) to afford the necessities of life for their household.

A theoretical "living wage" allows household earners to afford the necessities of life. In order to calculate a living wage for a specific community, it is necessary to estimate the local cost of living based on typical demographics, household expenses, and wages.



**Based on Monthly Expense and Vehicle Cost**



Required monthly income after taxes	\$2,149	\$3,585	\$4,135	\$5,284	\$3,379	\$3,920	\$4,073	\$4,894
Required annual income after taxes	\$25,787	\$43,019	\$49,619	\$63,408	\$40,546	\$47,038	\$48,874	\$58,727
Annual taxes	\$3,094	\$5,162	\$5,954	\$7,609	\$4,866	\$5,645	\$5,865	\$7,047
<b>Required Annual Income Before Taxes</b>	<b>\$28,881</b>	<b>\$48,181</b>	<b>\$55,573</b>	<b>\$71,017</b>	<b>\$45,412</b>	<b>\$52,683</b>	<b>\$54,739</b>	<b>\$65,774</b>

NOTE: Assumes 1 average sedan per adult and a mini van for families with 3 children. Cost estimates provided by a 2013 AAA "Your Driving Costs" report and reflect operating (gas, maintenance, and tires), insurance, license and registration, depreciation, and financing costs based on driving 10,000 miles annually.

SOURCE: Living Wage Calculator, Massachusetts Institute of Technology; AAA, Your Driving Costs; 4ward Planning, 2014

# Transportation Costs

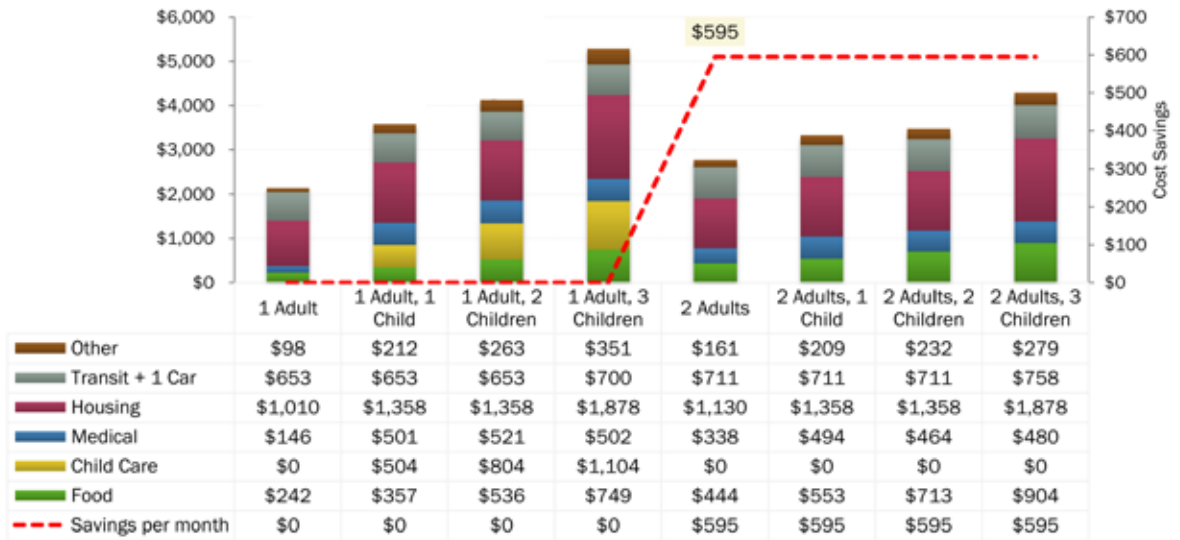
## Living Wage:

Assuming one-car ownership and a transit pass for the second adult, two adult households would save \$595 per month (equivalent to \$7,139 per year) while households with just one adult would continue to spend the same unless purchasing a transit pass.

Providing households with alternative, affordable and reliable transit options should help reduce reliance on automobile use.



**One-Car Ownership and a Transit Pass**



Required monthly income after taxes	\$2,207	\$3,672	\$4,251	\$5,429	\$2,842	\$3,412	\$3,594	\$4,444
Required annual income after taxes	\$26,483	\$44,063	\$51,011	\$65,148	\$34,103	\$40,943	\$43,127	\$53,328
Annual taxes	\$3,178	\$5,288	\$6,121	\$7,818	\$4,092	\$4,913	\$5,175	\$6,399
Required annual income before taxes	\$29,661	\$49,351	\$57,132	\$72,966	\$38,195	\$45,856	\$48,302	\$59,727

NOTE: Assumes Wave is included within Broward County Transit’s 31-Day Adult Pass at \$58 per adult and 31-Day Reduced Passes at \$29 per child. Assumes 1 average sedan per household and a mini van for families with 3 children. Cost estimates provided by a 2013 AAA “Your Driving Costs” report and reflect operating (gas, maintenance, and tires), insurance, license and registration, depreciation, and financing costs based on driving 10,000 miles annually.

SOURCE: Living Wage Calculator, Massachusetts Institute of Technology; AAA, Your Driving Costs; 4ward Planning, 2014

# Transportation Costs

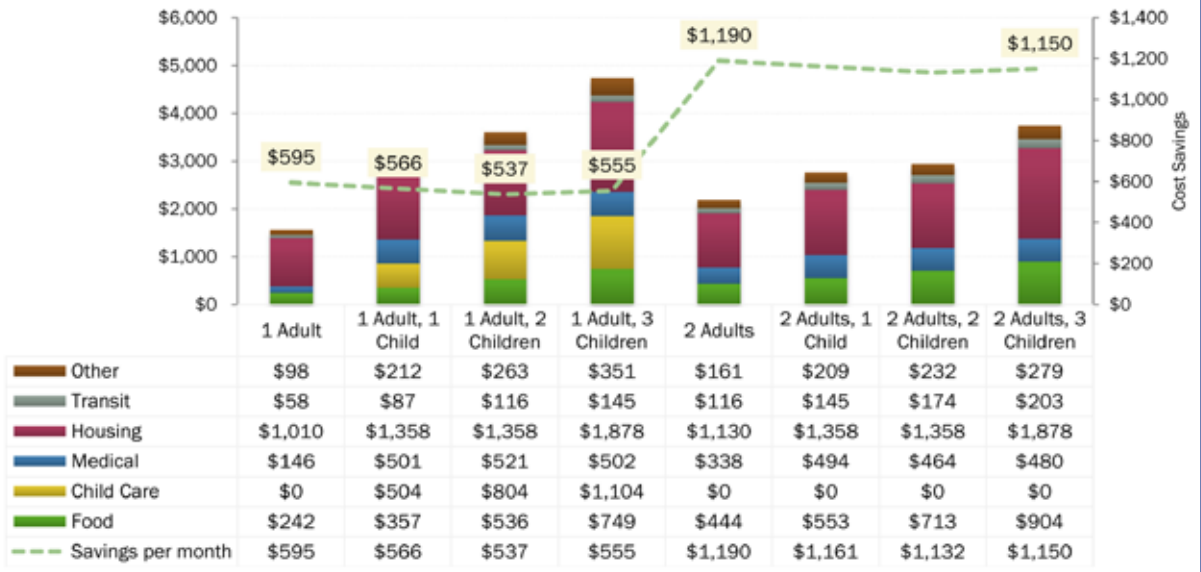
## Living Wage:

Transit spending, as a household's sole transportation cost could save Broward County households anywhere from \$537 to \$1,190 per month - equivalent to \$6,443 to \$14,278 per year.

Broward County households would save significantly if quality transit service allowed them to reduce their reliance on automobile use.



### Transit as a Household's sole Transportation Cost



Required monthly income after taxes	\$1,554	\$3,019	\$3,598	\$4,729	\$2,189	\$2,759	\$2,941	\$3,744
Required annual income after taxes	\$18,648	\$36,228	\$43,176	\$56,748	\$26,268	\$33,108	\$35,292	\$44,928
Annual taxes	\$2,238	\$4,347	\$5,181	\$6,810	\$3,152	\$3,973	\$4,235	\$5,391
Required annual income before taxes	\$20,886	\$40,575	\$48,357	\$63,558	\$29,420	\$37,081	\$39,527	\$50,319

NOTE: Assumes streetcar is included within Broward County Transit's 31-Day Adult Pass at \$58 per adult and 31-Day Reduced Passes at \$29 per child.

SOURCE: Living Wage Calculator, Massachusetts Institute of Technology; AAA, Your Driving Costs; 4ward Planning, 2014



# Transportation Costs

## Living Wage:

Currently, a sole provider earning a typical wage in the education, training and library sector (\$20.76) and living in a two-car, two-adult household would not earn a living wage (\$22 per hour) in Broward County. However, if that same sole provider had sufficient access to quality transit service to allow his household to own just one car, he would earn a living wage (\$18 per hour). Furthermore, if that same sole provider had sufficient access to quality transit service to allow his household to become car independent, he could save the equivalent to an additional \$4 per hour.

Occupational Area	Wage
Food Preparation and Serving Related	\$8.94
Personal Care and Services	\$9.68
Healthcare Support	\$11.73
Sales and Related	\$12.43
Transportation and Material Moving	\$12.71
Office and Administrative Support	\$13.65
Construction and Extraction	\$16.18
Protective Services	\$16.40
Community and Social Services	\$17.83
Arts, Design, Entertainment, Sports, and Media	\$19.32
Education, Training, and Library	\$20.76
Life, Physical, and Social Science	\$24.25
Business and Financial Operations	\$25.89
Healthcare Practitioner and Technical	\$26.78
Legal	\$29.29
Architecture and Engineering	\$29.94
Computer and Mathematical	\$30.34
Management	\$43.41

## Living Wage by Household Type: Broward County



SOURCE: Living Wage Calculator, Massachusetts Institute of Technology; AAA, Your Driving Costs; 4ward Planning, 2014

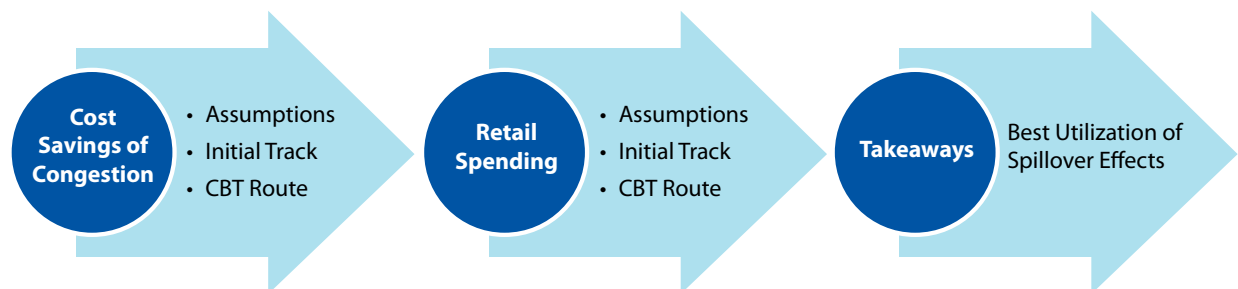
# Business Spillover Benefits

## Methodology

Business spillover effects from public transit are twofold: The first is the spillover effects from the cost savings of congestion (money not spent on gasoline or automotive maintenance), some of which is spent in the community. The second aspect occurs from ease of transit, allowing more people to pass through retail areas. This section will cover both forms of business spillover from the creation of the streetcar, on the initial and full track.

Congestion spillover data is derived from national statistics regarding congestion reduction savings from the Public Transit User's Association, combined with the number of workers, provided by OnTheMap, in the 1,000-foot zone around the streetcar track. We then multiply these effects by the spending effects, documented by Victoria Policy Transfer Institute to determine additional consumer spending from congestion reduction savings.

Retail spillover from proximity to streetcar stops is determined by the breakdown of retail establishments located along the 1,000 foot zone in ESRI, and the subsequent calculation of benefits to retail based upon prior streetcar benefits to businesses from the Studies on the Economic Development Impact of Passenger Rail report.



# Business Spillover Benefits

## Key Findings:

### **1.4 of every 100 pennies**

According to the Victoria Transport Policy Institute, for every \$1 that is transferred from the ownership and maintenance of a car to a standard household basket of spending, an extra 1.4 cents is transferred to local business establishments.

### **Effects small, but add up quickly**

Reducing congestion is a small, but cumulative means of putting money back into Broward resident's pockets – and into local cash registers. Even the most conservative estimates show an increase of almost \$10,000 in consumer spending, as a direct result of reduced spending on gasoline and car maintenance.

### **Substantial retail benefits from proximity to stops**

Through a comparative case study review of similar streetcar projects, nationally, the growth of sales in businesses near a transit stop grew 10 times compared to sales of similar businesses located further away from a streetcar stop. The full CBT route has a predicted \$77 million dollar increase in retail spending along the route.

## How much do commuters save and how much do they spend?

According to the Victoria Transport Policy Institute, for every \$1.00 that is transferred from the ownership and maintenance of a car to a standard household basket of spending, an extra \$0.014 cents is transferred to local business establishments.

### **Current Alignment: 34,981 employed within 1,000 feet of alignment**

- If \$10 annual per capita transit savings realized: \$4,870 additional consumer spending
- If \$50 annual per capita transit savings: \$24,350 additional consumer spending

### **Expanded Alignment: 66,168 employed within 1,000 feet of alignment**

- If \$10 annual per capita transit savings: \$9,211 additional consumer spending
- If \$50 annual per capita transit savings: \$46,059 additional consumer spending

# Business Spillover Benefits

## Wave Streetcar and Extensions

Total retail sales within Fort Lauderdale topped over \$2.5 billion in 2010. If retail sales were to grow, as predicted by the “Economic Impact of Streetcar Transit” report, area retailers could see an estimated 10 time increase in sales, over the sales figures for comparable businesses located further than 1,000 feet of a station stop. Assuming a 1% average growth in sales outside the 1,000 feet, the area within will see a 10% sales increase.

Due to the streetcar’s projected transportation mode substitution effects, automotive and gasoline sales are projected to fall slightly; accordingly, the following calculations look at non-automotive retail benefits from the proximity to the streetcar, which are substantial.

**Less Automotive Spending**



**More Retail Spending and Sales Near Transit**

	Current Retail Spending	Current Retail Automotive Spending	Spending Bonus to Non Automotive Retail	Additional Spending from Streetcar Proximity	Additional Total Spending Percentage in Streetcar Areas
<b>Current Wave</b>	\$41,420,983	\$6,203,663	10%	\$3,521,732	8.5%
<b>Extended Wave</b>	\$942,536,316	\$166,578,313	10%	\$77,595,800	8.2%

The above illustrates the estimated benefit to area businesses; the current Wave alignment would result in an estimated \$3.5 million increase in area household retail sales. Estimated household retail spending associated with an extended Wave alignment would increase by \$77.5 million.

SOURCE: Bureau of Labor Statistics, ESRI, Studies on the Economic Development Impact of Passenger Rail

# Business Spillover Benefits

## Broward Communities

According to a 1999 report, retail sales within the Dallas' Central Business District (CBD) grew by 36.2 percent after the opening of the DART Light Rail in 1996 (compared to 3.6 percent within the city, overall). As illustrated in the table below, existing retail can vary widely depending on existing land uses and spending patterns. In 2013, retail spending ranged from over \$63.2 million within the Wave Study Area, to just over \$1.3 million within the Hollywood Study Area. Assuming retail sales grew by one percent in the city overall and 10 times that within each study area, the Miramar Study Area could experience a retail spending increase of \$5 million per year (a 9.2-percent total increase), while the Hollywood study area might only experience an increase of \$132,800 per year, given difference in existing retail spending.

**Less Automotive Spending**



**More Retail Spending and Sales Near Transit**

### Retail Spillover Effects: Study Areas

Study Area	2013 Retail Spending	Current Automotive Spending	Spending Bonus to Non Automotive Retail	Additional Spending	Percent Total Spending Increase
<b>Miramar Study Area</b>	\$56,334,675	\$4,479,436	10%	\$5,185,524	9.2%
<b>Plantation Study Area</b>	\$29,285,905	\$1,536,299	10%	\$2,774,961	9.5%
<b>Hollywood Study Area</b>	\$1,328,033	\$0	10%	\$132,803	10.0%
<b>Sunrise Study Area</b>	\$2,520,714	\$0	10%	\$252,071	10.0%
<b>Wave Study Area</b>	\$63,282,179	\$54,327,665	10%	\$895,451	1.4%

SOURCE: Esri, 2013; The Initial Economic Impacts of the DART LRT System by Bernard L. Weinstein, Ph.D and Terry L. Clower, Ph.D, July 1999; 4ward Planning, Inc., 2014,

# Business Spillover Benefits

## Takeaway:

Motivated by a generally stagnant economy, high gas prices and a concern for the environment, many households living in areas offering quality, affordable and reliable transit service are choosing to use transit as an alternative means of commuting to and from work. As the true cost of driving a car, inclusive of annual maintenance, repair and fuel consumption, nears \$8,000 a year, the economic incentives for substituting transit for automobile use are becoming greater.

Further, the preceding analysis also demonstrates the plausibility that a large share of household cost savings realized through the substitution of transit commuting for automobile ownership and commuting will, likely, be funneled back into the local economy – increased spending at grocery stores, clothing and shoe retailers, restaurants and personal service establishments. This outcome is particularly plausible, given that U.S. Census research on household consumer expenditures shows lower- and moderate income households spend nearly 100 percent of discretionary income (e.g., income falling outside of what is required for shelter, transportation and food).

# Incremental Real Estate Value Change

## Key Findings:

### 8 percent

The average real estate premium for properties within Zones 1 and 2 of the Wave Streetcar and CBT route ranges from 7.6 for the Education Center Loop to 8.2 percent within the Wave Streetcar route. The average real estate premium would, likely, be higher if more of the surrounding land was zoned for mixed use, retail, or office, rather than single-family residential.

### \$66.8 to \$343.2 Million

The range in estimated real estate premium created by the Wave Streetcar scenarios on properties located within Zones 1 and 2 of each scenario - the "proximate value effect." This estimated value change results in an average real estate premium increase of eight percent, largely due to the predominance of single-family residential.

### \$6,00 to \$7,000 premium per property

The average estimated real estate premium created by the Wave Streetcar on all properties located within the identified zones.

Scenario	Properties	PER PROPERTY		TOTAL		Average Real Estate Premium
		Average Assessed Value	Value Change	Assessed Value (millions)	Value Change (millions)	
Wave Streetcar	4,910	\$85,674	\$6,989	\$4,207	\$343.2	8.2%
CBT Route	3,716	\$82,607	\$6,538	\$3,070	\$242.9	7.9%
Education Center	1,098	\$79,744	\$6,086	\$876	\$66.8	7.6%

# Transit Premium

## Overview:

Throughout the United States, despite differences in geographic location and local market conditions, proximity to transit has been shown to increase surrounding property values - a phenomenon known as the “transit premium.” Based on data provided by the Victoria Transport Policy Institute, CTOD, the Federal Transit Administration, and within our best-case analysis findings, transit premiums ranged from just a few percent to over a 167 percent. The increases in property values near transit were most dramatic for office and retail spaces. Transit premiums range from 44 percent to 167 percent for commercial properties; 9 to 120 percent for office properties; and from 0 to 45 percent for residential properties depending on the land use type, transit mode, distance to station, and occupancy. Although there are few national studies available that focus specifically on the impact of BRT, many international studies have shown BRT to have similar transit premiums as light rail.

In Bogotá, Colombia, Rodriguez and Targa (2004) found that a reduction of five minutes walking time to BRT stations increases property prices 6.8 to 9.3 percent. Munoz-Raskin (2007) found that middle-income households, who tend to use BRT most, pay 2.3 percent to 14.4 percent more for housing located close to Bogotá BRT stations.

CITY	MODE	LAND USE	REAL ESTATE PREMIUM
<b>RESIDENTIAL</b>			
Pittsburgh	BRT	Single Family	+\$9,745 for homes w/in 100 ft of station
San Diego	Light Rail	Single Family	+2% w/in 200 ft of station
San Diego	Light Rail	Condominium	+2% w/in 2,640 ft of station
San Diego	Light Rail	Apartment	+0% to 4% w/in 2,640 ft of station
Portland Gresham	Light Rail	Residential Rent	>5%
Boston (Silver Line)	BRT	Condo	+7.5%
Portland	Light Rail	House Prices	+10%
San Diego	Light Rail	Condominium	+18% w/in 2,640 ft of station
Memphis	Light Rail	Residential	+25% (+700+ within ¼ mile)
St Louis	Light Rail	Single Family	+32% w/in 1,000 ft of station
Santa Clara Valley	Light Rail	Apartment	+45% w/in 1,320 ft of station
<b>COMMERCIAL</b>			
Little Rock	Light Rail	Retail	+44%
Memphis	Light Rail	Vacant Retail	+77%
San Diego	Light Rail	Retail	167% w/in 200 ft of station
<b>OFFICE</b>			
Washington, DC	Light Rail	Office	+9% w/in 300 ft of station
Santa Clara Valley	Light Rail	Office	120% w/in 1,320 ft of station

SOURCE: Victoria Transport Policy Institute, Evaluating Public Transit Benefits and Costs: Best Practice Guidebook, March 2014; CTOD, Capturing the Value of Transit, November 2007. Federal Transit Administration, Land Use Impacts of Bus Rapid Transit, July 2012; Land Use Impacts of Bus Rapid Transit: Effect of BRT Station Proximity on Property Values along the Pittsburgh Martin Luther King, Jr. East Busway, December 2009; 4ward Planning, 2014



# Incremental Real Estate Value Change

## Transit Premium and Real Estate Value Change

Based on our preceding analysis, real estate values have the potential to increase anywhere from two to 45 percent, depending largely on land-use type and occupancy, for properties located within 500 feet of new or expanded transit service. Real estate values for properties located a bit further away (between 500 and 1,000 feet) have the potential to increase but at a lower rate, from 1.5 to 33 percent (a decay rate of 25 percent).

Land Use	% VALUE CHANGE ASSUMPTIONS	
	Less than 500ft	Between 500 - 1,000 ft
Residential (Vacant)	26%	19%
Single - Family	2.0%	1.5%
Apartments	4%	3%
Mixed - Use	45%	34%
Commercial (Vacant)	40%	30%
Retail	44%	33%
Office	9%	7%

SOURCE: 4ward Planning Inc., 2014



**Miramar Study Area:**  
Intersection of Miramar Blvd and S University Drive



**Sunrise Study Area:**  
W Oakland Park Blvd and N Pine Island Road

# Incremental Real Estate Value Change

## Methodology:

A model to estimate the projected incremental change in real estate values (the “proximity effect”) was developed for properties located along the Wave Streetcar route and two CBT route scenarios:

1. The CBT route from the intersection SW 17th Street and S Andrews Ave in Fort Lauderdale to Davie Road in the Town of Davie and...
2. The CBT route around the South Florida Education Center in Davie.

Three scenarios were modeled in order to compare the Wave Streetcar route with detailed land use and real estate trends for each CBT route scenario. Parcel data provided by Broward County was used to identify properties with centroids that fall within 500 feet of each transit route scenario (Zone 1) and parcels with centroids that fall within 500 to 1,000 feet of each transit route scenario (Zone 2). Each transit route scenario and zone is illustrated in the map on the following page.

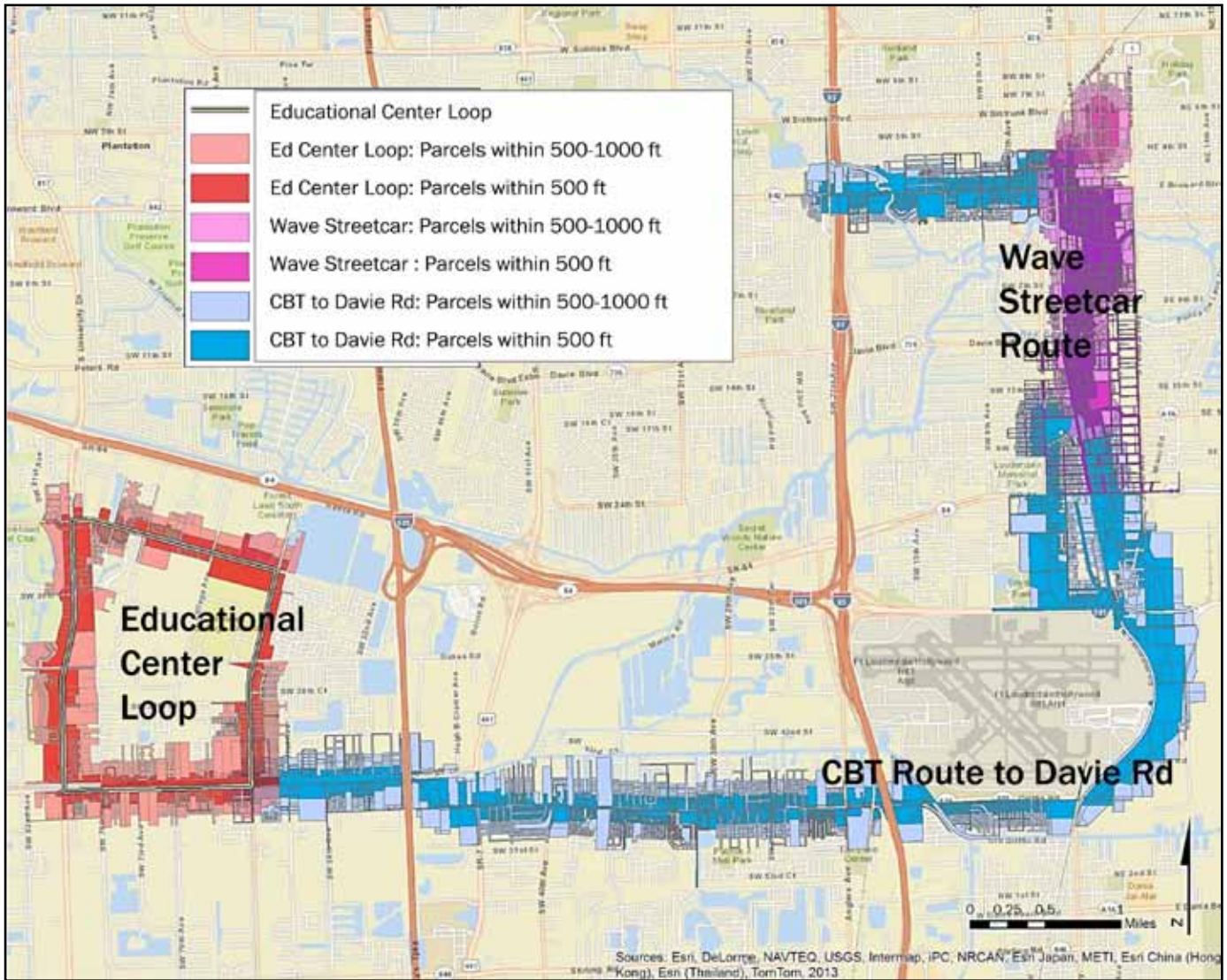
The model applies value change assumptions to Zone 1 based on transit premiums from other transit systems. The model assumes that increases in property values due to the CBT route are greatest for properties located closest to the route, in Zone 1. A zone value decay rate of 25 percent was applied to the percent value change assumption for properties located in Zone 2. The model also assumes that the rate of increase in property values associated from market improvements would be greatest for vacant properties given their development opportunity. As a result, a higher average value change assumption was given to vacant parcels. These assumptions and the corresponding land-use codes are outlined in the table to the right. This analysis omits properties zoned for auto-oriented commercial uses (service stations, parking lots).

		% VALUE CHANGE ASSUMPTIONS	
Land Use	Land Code	Zone 1 (<500ft)	Zone 2* (500 - 1,000 ft)
Residential (Vacant)	0	26%	19%
Single - Family	1	2.0%	1.5%
Apartments	3, 8	4%	3%
Mixed - Use	12	45%	34%
Commercial (Vacant)	10	40%	30%
Retail	11, 12-16, 21-22, 25, 29-30	44%	33%
Office	17-19, 23-24	9%	7%

\* Zone 2 Decay rate of 25%

# Incremental Real Estate Value Change

## Wave Streetcar and Extension Scenarios



# Incremental Real Estate Value Change

## Wave Streetcar Route

**Existing Conditions: Properties and Average Assessed Value by Land Use**



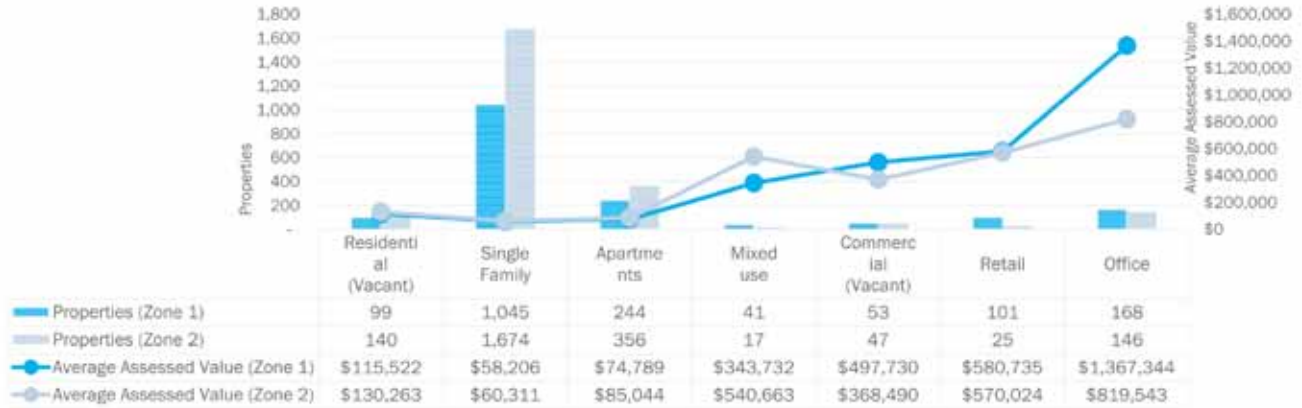
**Proximity Effect: Total and Average Value Change by Land Use**



# Incremental Real Estate Value Change

## Wave Extension

**Existing Conditions: Properties and Average Assessed Value by Land Use**



**Proximity Effect: Total and Average Value Change by Land Use**



# Incremental Real Estate Value Change

## Educational Center Loop

**Existing Conditions: Properties and Average Assessed Value by Land Use**



**Proximity Effect: Total and Average Value Change by Land Use**



# Existing Conditions

## Takeaways:

### Existing Conditions: Properties and Average Assessed Value by Land Use

Land Use	Properties				Assessed Value (millions)			Average Assessed Value		
	Zone 1	Zone 2	Total	% Total	Zone 1	Zone 2	Total	Zone 1	Zone 2	Weighted Average
<b>Wave Streetcar</b>										
Residential (Vacant)	158	175	333	7%	\$160	\$251	\$410	\$100,983	\$143,262	\$123,202
Single Family	1,387	2,257	3,644	74%	\$769	\$1,296	\$2,064	\$55,435	\$57,403	\$56,654
Apartments	295	424	719	15%	\$373	\$428	\$801	\$126,390	\$100,940	\$111,382
Mixed Use	53	25	78	2%	\$190	\$91	\$281	\$358,876	\$363,205	\$360,263
Commercial (Vacant)	86	50	136	3%	\$417	\$233	\$650	\$485,412	\$465,158	\$477,965
Retail	159	26	185	4%	\$1,012	\$357	\$1,369	\$636,268	\$1,373,767	\$739,917
Office	246	152	398	8%	\$2,714	\$1,274	\$3,988	\$1,103,218	\$837,934	\$1,001,904
	1,979	2,931	4,910	100%	\$1,909	\$2,298	\$4,207	\$96,460	\$78,392	\$85,674
<b>CBT to Davie Road</b>										
Residential (Vacant)	99	140	239	6%	\$114	\$182	\$297	\$115,522	\$130,263	\$124,157
Single Family	1,045	1,674	2,719	73%	\$608	\$1,010	\$1,618	\$58,206	\$60,311	\$59,502
Apartments	244	356	600	16%	\$182	\$303	\$485	\$74,789	\$85,044	\$80,874
Mixed Use	41	17	58	2%	\$141	\$92	\$233	\$343,732	\$540,663	\$401,453
Commercial (Vacant)	53	47	100	3%	\$264	\$173	\$437	\$497,730	\$368,490	\$436,987
Retail	101	25	126	3%	\$587	\$143	\$729	\$580,735	\$570,024	\$578,610
Office	168	146	314	8%	\$2,297	\$1,197	\$3,494	\$1,367,344	\$819,543	\$1,112,634
	1,482	2,234	3,716	100%	\$1,310	\$1,760	\$3,070	\$88,383	\$78,775	\$82,607
<b>Education Center Loop</b>										
Residential (Vacant)	30	22	52	5%	\$7	\$12	\$19	\$22,783	\$54,878	\$36,362
Single Family	275	634	909	83%	\$139	\$330	\$469	\$50,529	\$51,981	\$51,542
Apartments	21	77	98	9%	\$49	\$111	\$160	\$233,913	\$144,437	\$163,611
Mixed Use	7	3	10	1%	\$37	\$10	\$47	\$531,601	\$327,503	\$470,372
Commercial (Vacant)	26	3	29	3%	\$140	\$41	\$181	\$536,734	\$1,374,620	\$623,412
Retail	53	7	60	5%	\$408	\$219	\$627	\$769,752	\$3,132,657	\$1,045,424
Office	32	6	38	3%	\$134	\$15	\$150	\$419,991	\$256,517	\$394,179
	359	739	1,098	100%	\$372	\$504	\$876	\$103,531	\$68,188	\$79,744

#### Wave Streetcar Route

- 4,910 properties
- \$4.2 billion in assessed value
- Average assessed value of \$85,674

#### CBT to Davie Road

- 3,716 properties
- \$3.0 billion in assessed value
- Average assessed value of \$82,607

#### Educational Center Loop

- 1,098 properties
- \$876 million in assessed value
- Average assessed value of \$79,744

SOURCE: Broward County, 4ward Planning Inc, 2014

# Proximity Effect

## Takeaways:

### Proximity Effect: Total and Average Value Change by Land Use

#### Wave Streetcar Route

- \$343.2 million estimated increase in real estate values
- Average value change of \$6,989 per property

#### CBT to Davie Road

- \$242.9 million increase in real estate values
- Average value change of \$6,538 per property

#### Educational Center Loop

- \$66.8 million increase in real estate values for properties
- Average value change of \$6,068 per property

Land Use	Value Change (millions)			Average Value Change		
	Zone 1	Zone 2	Total	Zone 1	Zone 2	Weighted Average
<b>Wave Streetcar</b>						
Residential (Vacant)	\$39.9	\$47.0	\$86.9	\$25,246	\$26,862	\$26,095
Single Family	\$15.4	\$19.4	\$34.8	\$1,109	\$861	\$955
Apartments	\$14.9	\$12.8	\$27.8	\$5,056	\$3,028	\$3,860
Mixed Use	\$38.0	\$13.6	\$51.7	\$71,775	\$54,481	\$66,232
Commercial (Vacant)	\$100.2	\$41.9	\$142.1	\$116,499	\$83,728	\$104,451
Retail	\$404.7	\$107.2	\$511.8	\$254,507	\$412,130	\$276,660
Office	\$217.1	\$76.4	\$293.5	\$88,257	\$50,276	\$73,752
	\$208.4	\$134.8	\$343.2	\$10,531	\$4,598	\$6,989
<b>CBT to Davie Road</b>						
Residential (Vacant)	\$28.6	\$34.2	\$62.8	\$28,881	\$24,424	\$26,270
Single Family	\$12.2	\$15.1	\$27.3	\$1,164	\$905	\$1,004
Apartments	\$7.3	\$9.1	\$16.4	\$2,992	\$2,551	\$2,730
Mixed Use	\$28.2	\$13.8	\$42.0	\$68,746	\$81,099	\$72,367
Commercial (Vacant)	\$63.3	\$31.2	\$94.5	\$119,455	\$66,328	\$94,486
Retail	\$234.6	\$42.8	\$277.4	\$232,294	\$171,007	\$220,134
Office	\$183.8	\$71.8	\$255.6	\$109,388	\$49,173	\$81,389
	\$139.6	\$103.4	\$242.9	\$9,417	\$4,628	\$6,538
<b>Education Center Loop</b>						
Residential (Vacant)	\$1.7	\$2.3	\$4.0	\$5,696	\$10,290	\$7,639
Single Family	\$2.8	\$4.9	\$7.7	\$1,011	\$780	\$850
Apartments	\$2.0	\$3.3	\$5.3	\$9,357	\$4,333	\$5,410
Mixed Use	\$7.4	\$1.5	\$8.9	\$106,320	\$49,126	\$89,162
Commercial (Vacant)	\$33.5	\$7.4	\$40.9	\$128,816	\$247,432	\$141,087
Retail	\$163.2	\$65.8	\$229.0	\$307,901	\$939,767	\$381,622
Office	\$10.8	\$0.9	\$11.7	\$33,599	\$15,391	\$30,724
	\$47.4	\$19.4	\$66.8	\$13,200	\$2,631	\$6,086

SOURCE: Broward County, 4ward Planning Inc, 2014



# Economic Impact Analysis

## Key Findings:

### Wave Streetcar Route:

#### **1,400 jobs, \$220 million in output, and \$5.8 million in taxes**

Projected investment of \$142.59 million to construct the Wave Streetcar is estimated to result in over 1,400 total jobs, nearly \$220 million in total economic output, and just under \$5.8 million in state and local taxes by mid-2016.

### Central Broward East-West Transit Route:

#### **An additional 8,500 jobs, \$1.3 billion in output, and \$34.1 million in taxes**

Assuming the CBT route is constructed at the same cost per mile as the Wave, this project would require \$838 million in capital costs and result in an additional 8,500 jobs, \$1.3 billion in total economic output, and just under \$34.1 million in state and local taxes in mid-2016.

### Broward County:

#### **21 jobs created per \$1 million spent on public transit**

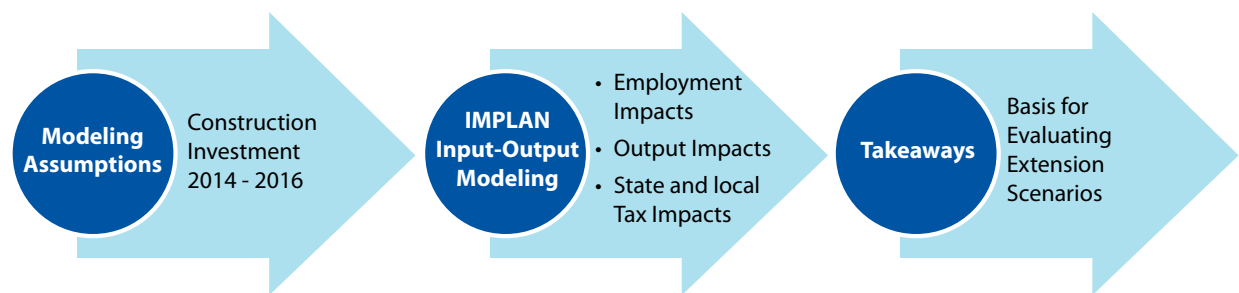
Every \$1 million investment in transit and ground passenger transportation in Broward County is estimated to result in 21 total jobs, over \$1.4 million in total economic output, and \$62,100 in state and local taxes. This is compared to 10 jobs for every \$1 million investment in non residential construction (e.g. new roads, rails, or transit infrastructure) and 11 total jobs for the maintenance and repair of these structures. Bus rapid transit (BRT) exhibits a similar employment multiplier to streetcars, and is estimated to be implemented at a much lower capital cost.

# Economic Impact Analysis

## Methodology:

An economic impact analysis of the construction of the prospective Central Broward East-West Transit route within Broward County, Florida was conducted. IMPLAN 3.0 software and Broward County 2012 demographic and industry data sets (the most currently available data within IMPLAN) were used to develop projected countywide economic impacts associated with the potential transit capital investments.

It is worth noting that the following analysis applies exclusively to the construction of the Wave and CBT route, and does not attempt to capture the economic impacts associated with future operations or additional economic events occurring after construction is completed.



The following key inputs underpin the economic impact modeling exercise:

- Estimated \$142.6 million direct investment in construction materials and labor, occurring between 2014 and mid-2016 (see following pages for specific funding breakdown)
- Streetcar construction along the CBT route at the same cost per mile of \$52.81 million
- Bus Rapid Transit system implementation along the CBT routes at \$18.39 million per mile

# Economic Impact Analysis

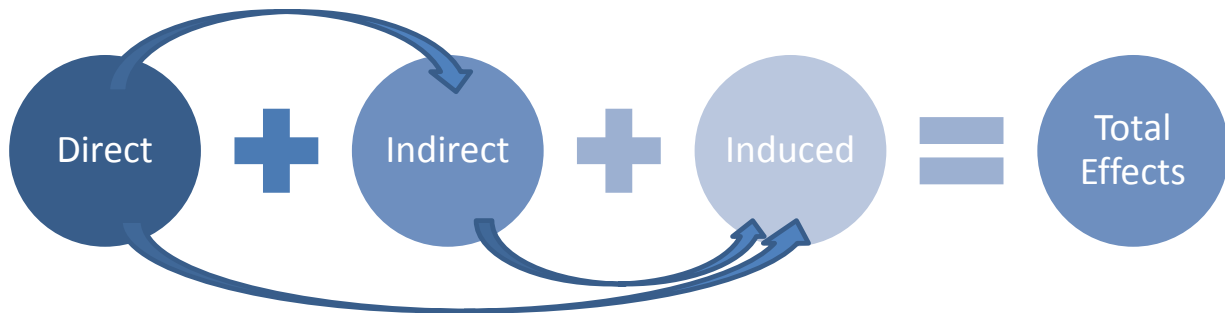
## Methodology:

### General Input-Output Impact Modeling

Economic impact analysis involves applying a final demand change to a predictive economic input-output model, and then analyzing the resulting changes in the economy under study.

More concisely, an impact analysis is an assessment of change in overall economic activity as a result of change in one or several specific economic activities.

Economic impacts, whether for employment or output, are typically referenced as **direct**, **indirect**, and **induced**. The estimated direct, indirect, and induced impacts were expressed for each year in this analysis.



**Direct impacts are the result of a change in final demand.**

For example, if \$10 million is invested in building construction, increasing demand for buildings by \$10 million...

**Indirect effects result from changes in demand for factors of production.**

...the \$10 million increase in the construction industry sector revenue causes a \$4 million increase in purchase orders to related industries, like lumber and heavy machinery.

**Induced effects result from changes in household spending.**

Building construction, lumber production, and heavy machinery manufacturing pay their workers wages to deliver various products, enabling workers to spend an additional \$100,000 within the regional economy.

**Total effects are the combination of direct, indirect, and induced effects.**

The total effect of a \$10 million increase in building construction demand, then, is equal to \$14.1 million (\$10 million + \$4 million + \$100,000).

# Economic Impact Analysis

## Methodology:

IMPLAN Professional 3.0, a widely used economic impact assessment software system was used for this analysis. IMPLAN is designed to simplify and expedite input-output accounting process (e.g., commodity flows from producers to intermediaries to final consumers and all related multipliers associated with output and employment for a given geography).

In order to adequately evaluate the prospective economic impacts of construction of the Wave streetcar, as well as CBT route, we purchased the most recent economic and demographic data files (2012) for Broward County, Florida. This data file, once combined with the IMPLAN Professional 3.0 software system, permits the creation of a detailed Social Accounting Matrix (SAM) and location-specific multipliers for the area.

Direct, indirect, and induced economic impacts were analyzed for the streetcar construction and CBT investments, and are modeled as occurring between 2014 and mid-2016. All dollar figures are presented in current dollars. The \$18.39 million cost per mile assumption for bus rapid transit implementation is based on the findings of a 2009 by the University of Texas entitled "Bus Versus Rail: Meta-Analysis of Cost Characteristics, Carrying Capacities, and Land Use Impacts." The table below highlights the cost estimates used to determined total capital investment for the initial Wave construction.

Sources of Funds	Total Funds (millions)	Percent of Total
<b>FEDERAL</b>		
• Section 5309 Small Starts	\$49.65	34.8%
• TIGER IV	\$18.00	12.6%
• FHWA Flexible Funds (STP)	\$3.50	2.5%
<b>STATE</b>		
• Florida New Starts Transit Program	\$35.73	\$25.1%
<b>LOCAL</b>		
• City of Fort Lauderdale Cash and Land Contribution	\$10.50	7.4%
• Special Assessment District	\$20.59	14.4%
• SFRTA General Fund	\$4.62	3.2%
<b>TOTAL</b>	<b>\$142.59</b>	<b>100%</b>

# Economic Impact Analysis

## Key Findings: Estimated Employment Impacts

**Estimated Range of Total Employment Impacts by Scenario**



**Estimated Range of Total Total Output Impacts by Scenario (millions)**



SOURCE: IMPLAN 3.0; 4ward Planning Inc. 2014

# Economic Impact Analysis

## Key Findings: Estimated State and Local Tax Impacts

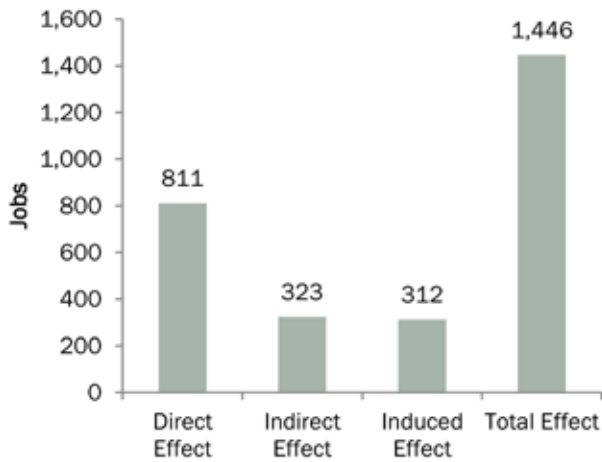
### Estimated Tax Impacts by Construction Scenario

	Wave Construction	Total Streetcar Extensions	Total BRT Extensions	Wave and Total Streetcar Extensions	Wave and Total BRT Extensions
Dividends	\$12,993	\$76,373	\$35,151	\$89,366	\$48,144
Social Ins Tax- Employee Contribution	\$48,751	\$286,551	\$131,086	\$335,302	\$179,837
Social Ins Tax- Employer Contribution	\$95,849	\$563,388	\$257,729	\$659,237	\$353,578
Indirect Bus Tax: Sales Tax	\$2,543,378	\$14,949,644	\$6,827,405	\$17,493,022	\$9,370,783
Indirect Bus Tax: Property Tax	\$1,986,172	\$11,674,462	\$5,331,650	\$13,660,634	\$7,317,822
Indirect Bus Tax: Motor Vehicle License	\$46,716	\$274,592	\$125,405	\$321,308	\$172,121
Indirect Bus Tax: Severance Tax	\$5,322	\$31,279	\$14,285	\$36,601	\$19,607
Indirect Bus Tax: Other Taxes	\$248,238	\$1,459,108	\$666,365	\$1,707,346	\$914,603
Indirect Bus Tax: S/L NonTaxes	\$53,383	\$313,779	\$143,301	\$367,162	\$196,684
Corporate Profits Tax	\$230,922	\$1,357,327	\$624,714	\$1,588,249	\$855,636
Personal Tax: Income Tax	\$0	\$0	\$0	\$0	\$0
Personal Tax: NonTaxes (Fines- Fees	\$388,849	\$2,285,604	\$1,031,164	\$2,674,453	\$1,420,013
Personal Tax: Motor Vehicle License	\$93,348	\$548,688	\$247,544	\$642,036	\$340,892
Personal Tax: Property Taxes	\$37,315	\$219,332	\$98,953	\$256,647	\$136,268
Personal Tax: Other Tax (Fish/Hunt)	\$5,986	\$35,184	\$15,874	\$41,170	\$21,860
<b>Total State and Local Tax</b>	<b>\$5,797,222</b>	<b>\$34,075,313</b>	<b>\$15,550,624</b>	<b>\$39,872,535</b>	<b>\$21,347,846</b>

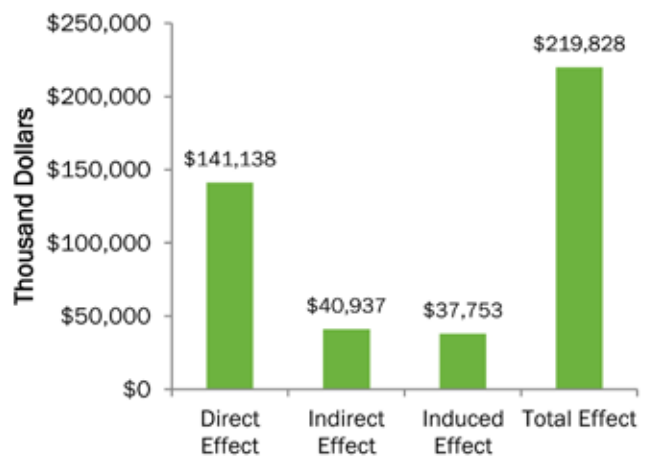
# Economic Impact Analysis

## Key Findings: Bus Rapid Transit Extension Construction

**Employment Impacts of Wave Construction**



**Output Impact of Wave Construction**



Economic Impacts of Wave Construction, 2014 - 2016		
	Employment	Output
Direct Effect	811	\$141,137,762
Indirect Effect	323	\$40,937,056
Induced Effect	312	\$37,753,421
Total Effect	1,446	\$219,828,239

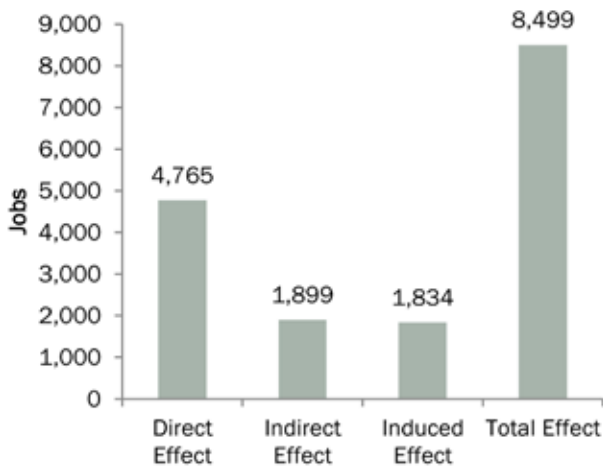
Top Industries by Indirect and Induced Employment, 2014-2016	
	Indirect and Induced Employment
Architectural, engineering, and related services	86
Food services and drinking places	51
Employment services	31
Real estate establishments	26
Offices of physicians, dentists, and other health practitioners	22

Top Industries by Indirect and Induced Output, 2014-2016	
	Indirect and Induced Output
Architectural, engineering, and related services	\$9,573,502
Real estate establishments	\$4,320,557
Monetary authorities and depository credit intermediation	\$3,635,840
Wholesale trade businesses	\$3,598,598
Food services and drinking places	\$3,229,827

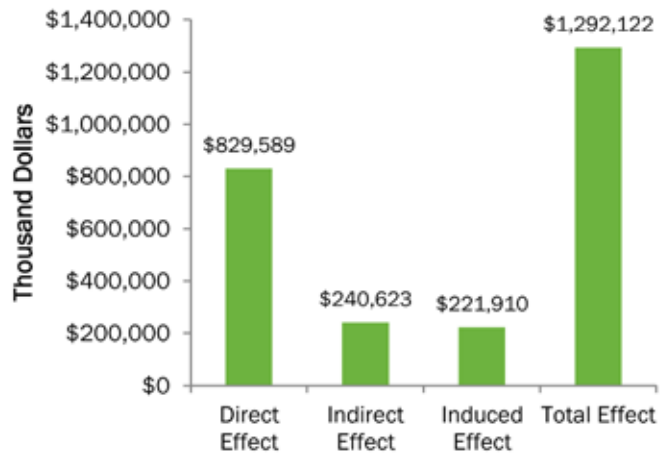
# Economic Impact Analysis

## Key Findings: Streetcar Extension Construction

**Employment Impacts of CBT Route**



**Output Impact of CBT Route**



Economic Impacts of CBT Route, 2014 - 2016		
	Employment	Output
Direct Effect	4,765	\$829,589,375
Indirect Effect	1,899	\$240,622,684
Induced Effect	1,834	\$221,909,690
Total Effect	8,499	\$1,292,121,749

Top Industries by Indirect and Induced Employment, 2014-2016	
	Indirect and Induced Employment
Architectural, engineering, and related services	503
Food services and drinking places	299
Employment services	182
Real estate establishments	156
Offices of physicians, dentists, and other health practitioners	127

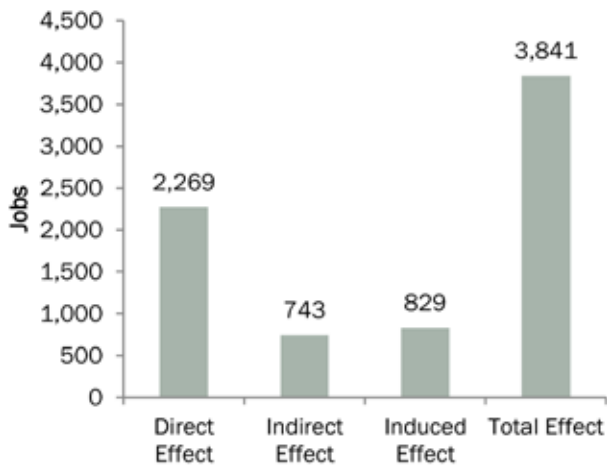
Top Industries by Indirect and Induced Output, 2014-2016	
	Indirect and Induced Output
Architectural, engineering, and related services	\$56,271,801
Real estate establishments	\$25,395,673
Monetary authorities and depository credit intermediation	\$21,370,998
Wholesale trade businesses	\$21,152,087
Food services and drinking places	\$18,984,501



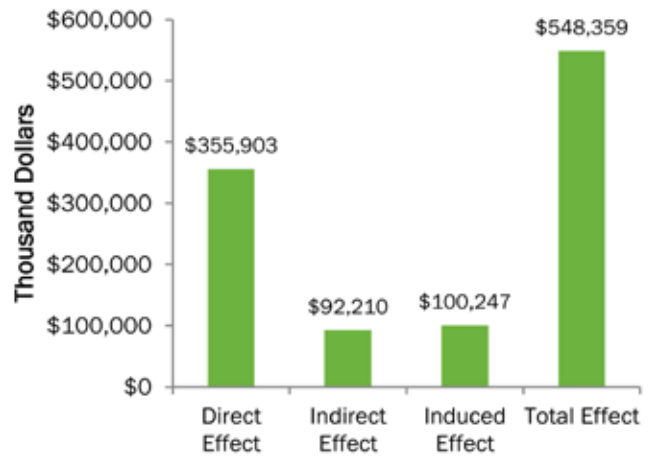
# Economic Impact Analysis

## Key Findings: Bus Rapid Transit Extension Construction

**Employment Impacts of BRT Extensions**



**Output Impacts of BRT Extensions**



Economic Impacts of BRT Extension, 2014 - 2016		
	Employment	Output
Direct Effect	2,269	\$355,902,836
Indirect Effect	743	\$92,209,903
Induced Effect	829	\$100,246,716
Total Effect	3,841	\$548,359,455

Top Industries by Indirect and Induced Employment, 2014-2016	
	Indirect and Induced Employment
Architectural, engineering, and related services	140
Food services and drinking places	132
Real estate establishments	68
Retail Stores - General merchandise	63
Offices of physicians, dentists, and other health practitioners	57

Top Industries by Indirect and Induced Output, 2014-2016	
	Indirect and Induced Output
Architectural, engineering, and related services	\$15,682,789
Real estate establishments	\$11,112,206
Wholesale trade businesses	\$9,003,419
Monetary authorities and depository credit intermediation	\$8,767,700
Food services and drinking places	\$8,364,431

# Economic Impact Analysis

## Takeaway:

The preceding analysis of the direct, indirect, and induced economic impacts associated with the construction of the Wave Streetcar route lead to the following conclusions:

- Projected investment of over \$142 million to construct the Wave Streetcar is estimated to result in over 1,400 total jobs, nearly \$220 million in total economic output, and just under \$5.8 million in state and local taxes by mid-2016.
- Assuming the streetcar was extended at the same cost per mile and completed in mid-2016, the project would require an additional \$838 million in capital costs and result in nearly 8,500 more jobs, \$1.3 billion in total economic output, and just under \$34.1 million in state and local taxes by mid-2016.
- Bus rapid transit (BRT) exhibits a similar employment multiplier to streetcars, and is estimated to be implemented at a much lower capital cost.

### Summary of Economic Impacts, 2014-2016

	Capital Costs (million)	Employment (Total Effect)	Output (million)	Total State and Local Taxes (million)
Wave Streetcar Construction	\$142.59	1,446	\$219.8	\$5.8
Wave Streetcar Extensions	\$838.13	8,449	\$1,292.1	\$34.1
BRT Extensions	\$359.56	3,841	\$548.4	\$15.6
Wave + Streetcar Extensions	\$980.72	9,895	\$1,511.9	\$39.9
Wave + BRT Extensions	\$502.15	5,287	\$768.2	\$21.4

# Economic Impact Analysis

## Takeaway:

The table below compares the estimated direct employment, output and tax impacts associated with every \$1 million dollar of investment within non residential construction (e.g. transit infrastructure), maintenance and repair of non residential structures, and transit and ground passenger transportation in Broward County. The following summarizes key observations:

- Every \$1 million investment in non residential construction is estimated to result in 10 total jobs, over \$1.5 million in total economic output, and \$41,075 in state and local taxes.
- Every \$1 million investment in the maintenance and repair of non residential structures is estimated to result in 11 total jobs, over \$1.5 million in total economic output, and \$43,692 in state and local taxes.
- Every \$1 million investment in transit and ground passenger transportation is estimated to result in 21 total jobs, over \$1.4 million in total economic output, and \$62,100 in state and local taxes.

### Economic Impacts per \$1 Million Investment, 2014

	Direct Employment (Total Effect)	Direct Output	Total State and Local Taxes (million)
Non Residential Construction	10	\$1,557,543	\$41,075
Maintenance and Repair of Non Residential Structure	11	\$1,540,756	\$43,692
Transit and Ground Passenger Transportation	21	\$1,463,498	\$62,100

SOURCE: IMPLAN, 4ward Planning Inc., 2014

# Improvement to Land Value Analysis

## Key Findings:

### Wave Streetcar and Central Broward East-West Transit Routes

#### **1,071 acres of underutilized land**

There are approximately 1,931 acres of commercial, industrial, and mixed use land whose boundaries fall within a ¼ mile of the Wave and CBT routes. Of this land, more than half (1,071 acres) have a low improvement-to-land value ratios and provide prospective transit development opportunities.

#### **Mixed-use and commercial infill opportunities**

There are 727 acres of vacant and underutilized commercial land and 42 acres of mixed use land within the study area. While the majority of this land is scattered throughout the study area, these infill parcels present opportunities to increase residential and commercial development along The Wave line--bringing new residents, employees and transit users into the study area.

#### **Large industry employment attraction opportunities**

Large parcels with low ILV ratios located within the study area, immediate northeast of the airport and to the east of Florida's Turnpike, provide opportunities to attract large private industry employers (e.g., manufacturers, back-office call centers, distribution warehouse operators) who prefer to locate in areas with concentrations of large contiguous vacant and/or underutilized land.

### South Florida Education Center Loop

#### **441 acres of underutilized land**

There are approximately 713 acres of commercial, industrial, and mixed-use land whose boundaries fall within a quarter-mile of the South Florida Education Center Loop. Of this land, nearly 62 percent (441 acres) has low improvement-to-land value ratios, offering substantial transit redevelopment opportunities.

#### **Large industry employment attraction opportunities**

There are 320 acres of underutilized commercial land and 172 acres of underutilized industrial land within a quarter mile of the South Florida Education Center Loop. Many of these underutilized parcels are sizable and clustered together, providing opportunities to attract large private industry employers (e.g., manufacturers, back-office call centers, distribution warehouse operators) who prefer to locate in areas with concentrations of large contiguous vacant and/or underutilized land.

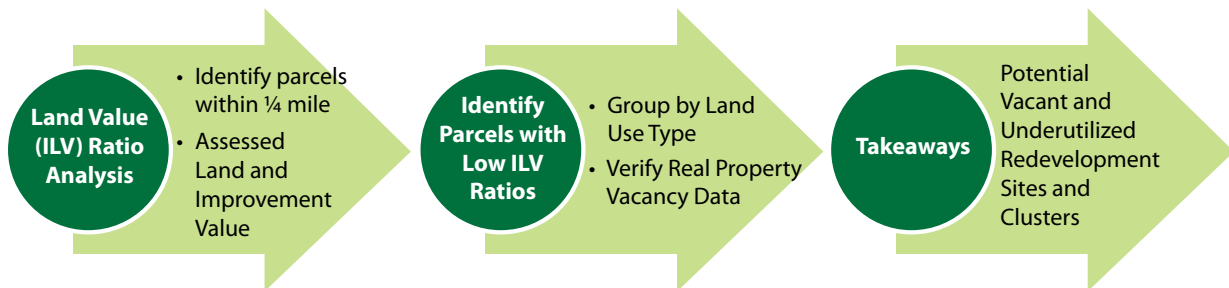
#### **Commercial infill opportunities**

There are clusters of small commercial properties located on the southeast portion of the South Florida Education Center Loop. While these parcels represent development opportunities—thus bringing new residents, employees, and transit users to the area—stimulating infill in this area may require additional incentives like density bonuses, parking reductions, permit streamlining, or fee waivers.

# Improvement to Land Value Analysis

## Methodology:

The Improvement to Land Value (ILV) ratio is determined by comparing the assessed value of the improvement (building) to the assessed value of the land. The ILV ratio analysis is one technique used to identify prospective redevelopment opportunities within a given locality. Utilizing Geographic Information System (GIS) mapping technology (ArcGIS 10.2) and Broward County tax assessor land and improvement data, properties in the area surrounding the Wave and CBT routes exhibiting relatively low ILV ratios were identified. In particular, we analyzed all parcels whose boundaries fall within a ¼ mile of these routes. So as to be inclusive, this includes parcels that are not wholly within the ¼ mile distance, but are at least partly within this boundary. We then grouped parcels according to land-use category (e.g., commercial, industrial) and calculated the ILV ratio statistical median for each category. Properties exhibiting particularly low ILV ratios (e.g., properties with ILV values less than half of the median ILV value of their land-use category) were identified as potential redevelopment sites. As further validation, real property vacancy data using LoopNet, an online commercial real estate listing service, was gathered. Parcels with both low ILV ratios and vacancies were, consequently, identified as likely redevelopment candidates.

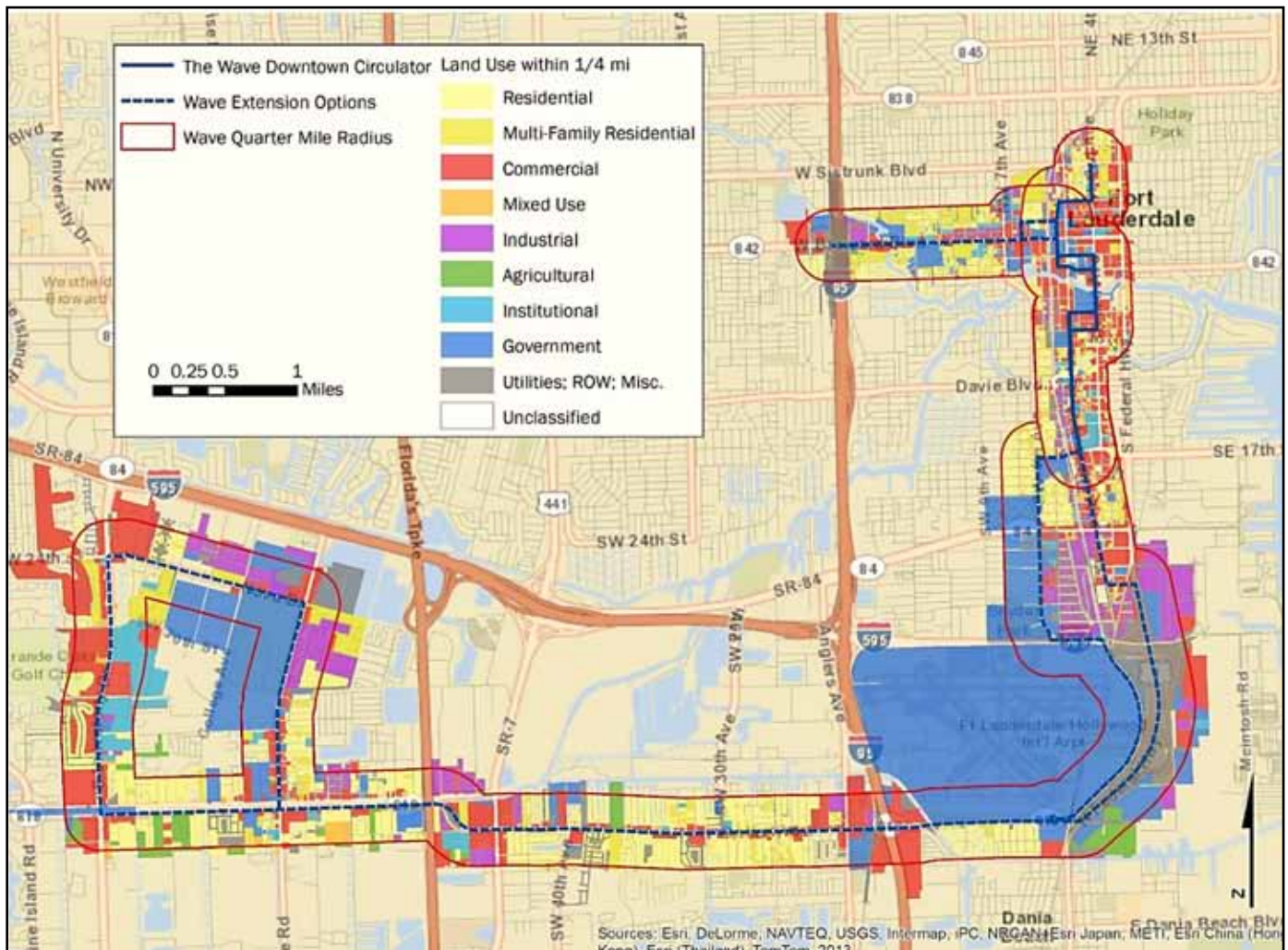


# Land Use

## The Wave and Central Broward East-West Transit Route

Land use in the study area is dominated by “government” (mainly due to the inclusion of the Ft. Lauderdale/ Hollywood Airport). The second largest land use category is residential (including multi-family) followed by commercial, utilities/right-of-way/ miscellaneous, and industrial.

Gaps in the land use layer are those parcels which are not entered in the BCPA tax roll and therefore cannot be analyzed (mainly rights -of-way and condominiums).



SOURCE: Broward County Property Appraiser; Jacobs Engineering; 4ward Planning Inc., 2014

# Low ILV Parcels

## All Land Uses

Parcels in the following land-use categories were analyzed:

**Commercial:** Parcels designated as commercial land use: Broward County land use codes 10, 11, and 13-39

**Mixed-use:** Broward County land use code 12: "Mixed use – store and office or store and residential or residential combination"

**Industrial:** Parcels designated as industrial land use: Broward County land use codes 40-49



SOURCE: Broward County Property Appraiser; Jacobs Engineering; 4ward Planning Inc., 2014

# Low ILV Parcels

## Commercial

There are 1,446 commercial parcels in the study area for a total of 1,305 acres. The median ILV ratio for commercial properties is 1.10, making the threshold ILV ratio for commercial use **0.55**. Based on this measure, *832 commercial parcels exhibit low ILV ratios comprising 727 acres.*



SOURCE: Broward County Property Appraiser; Jacobs Engineering; 4ward Planning Inc., 2014



# Low ILV Parcels

## Mixed Use

There are 87 mixed use parcels in the study area comprising 57 acres. The median ILV ratio is 2.47, making the target ILV ratio for mixed use **1.24**. Based on this measure, *43 mixed use parcels exhibit low ILV ratios for a total of 42 acres.*

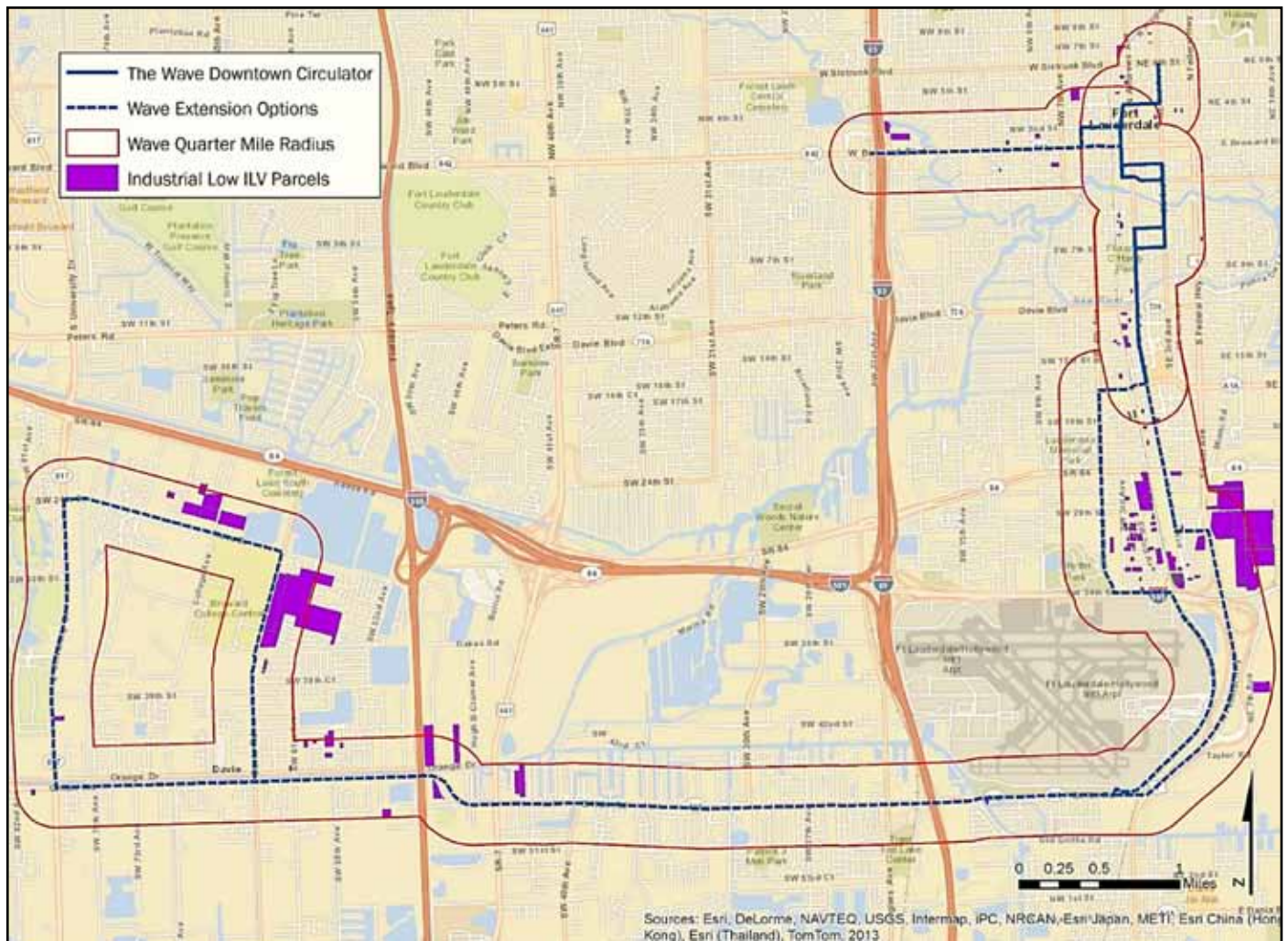


SOURCE: Broward County Property Appraiser; Jacobs Engineering; 4ward Planning Inc., 2014

# Low ILV Parcels

## Industrial

There are 670 industrial parcels in the study area comprising 569 acres. The median ILV ratio for these properties is 1.90, making the threshold ILV ratio for industrial parcels **0.95**. Based on this measure, *211 industrial parcels exhibit low ILV ratios - comprising nearly 302 acres or 53 percent of the total industrial acreage.*



SOURCE: Broward County Property Appraiser; Jacobs Engineering; 4ward Planning Inc., 2014

# Land Valuation Analysis

## Wave Streetcar and Central Broward East-West Transit Routes

There are approximately 1,931 acres of commercial, industrial, and mixed use land whose boundaries fall within a ¼ mile of the Wave and CBT routes. Of this land, more than half (1,071 acres) have low improvement-to-land value ratios and provide prospective transit development opportunities. Approximately 56 percent of commercial land in the study area has a low ILV ratio, as well as 74 percent of the mixed use land and 53 percent of the industrial land. For both mixed use and industrial land, the underutilized parcel share is a good deal lower than the share of underutilized acres, suggesting that many of the parcels with low ILV ratios are large.

### Summary of Underutilized Land in The Wave Study Area

	Commercial	Mixed Use	Industrial	Total
Parcels (count)	1,446	87	670	2,203
Underutilized parcels (count)	832	43	211	1,086
Underutilized parcels (share)	57.5%	49.4%	31.5%	49.3%
Acres (total)	1,305	57	569	1,931
Underutilized acres (total)	727	42	302	1,071
Underutilized acres (share)	55.7%	73.7%	53.0%	55.5%

SOURCE: Broward County Property Appraiser; Jacobs Engineering; 4ward Planning Inc., 2014

# Low ILV Parcels

## South Florida Education Center Loop

Specifically around the South Florida Education Center, there are approximately 713 acres of commercial, industrial, and mixed-use land whose boundaries fall within a quarter-mile of loop. Of this land, more than half (about 441 acres) has low improvement-to-land value (ILV) ratios, offering substantial transit development opportunities. Approximately 60 percent of commercial land within this area has a low ILV ratio, as well as 54 percent of the mixed-use land and 65 percent of the industrial land. For industrial land, the underutilized parcel share is a good deal lower than the share of underutilized acres, suggesting that many of the parcels with low ILV ratios are large.

### Summary of Underutilized Land within the South Florida Education Center Loop

	Commercial	Mixed Use	Industrial	Total
Parcels (count)	202	12	50	264
Underutilized parcels (count)	107	7	22	136
Underutilized parcels (share)	53.0%	58.3%	44.0%	51.5%
Acres (total)	524.9	16.0	172.0	712.9
Underutilized acres (total)	320.1	8.6	112.15	440.85
Underutilized acres (share)	60.1%	53.7%	65.2%	61.8%

SOURCE: Broward County Property Appraiser; Jacobs Engineering; 4ward Planning Inc., 2014

# Land Valuation Analysis

## Vacancies

Vacancies within the Broward County study area were analyzed using data from LoopNet. The table below lists low ILV properties that are also either for sale or for lease. Although some addresses contain multiple parcels with their own entries in the tax database, all addresses with both a vacancy and at least one low ILV parcel are listed.

### Key Vacancies in The Wave Study Area

Address	Land Use	Owner	Size (SF)
100 SE 6th St	Industrial: office showroom	One Hundred Sixth Street Inc.	6,400
1001 S. Andrews Ave	Office Building	Write Stuff Enterprises Inc.	4,780
1116 W. Broward Blvd	Retail: free standing building	Noor Investments Realty LLC	4,138
1212-1222 S. Andrews Ave	Office Building	Old LLC	1,834
1815 Griffin Rd	Office Building	The Red Hot Shack LLC	14,954
1830 SE 4th Ave	Office Building	Collegeview Holdings LLC	4,057
200 SW 1st Ave	Office Building	One West LOA LLC	32,574
2051 Griffin Rd	Marina	Thunderboat Marine Center Inc.	87,630
333 Las Olas Way	Office Building	ECDMG Interests Ltd. Partner	17,516
3020 S Federal Hwy	Industrial: flex space	Alpar Enterprises Inc.	22,102
350 E. State Rd 84	Commercial land and industrial: warehouse	Sailorman Properties II LLC / Diversified Wholesale Marine Inc.	78,710
545 N. Andrews Ave	Office Building	McKinley Financial Services Inc.	12,500
600 SW 4th Ave	Office Building	Silver & Loeb Holdings Inc.	1,320
888 SE 3rd Ave	Office Condo	She Station LLC / McNab Commercial Center No 1 LLC	5,627

SOURCE: Loopnet.com; 4ward Planning Inc., 2014

# Potential Redevelopment Opportunities

## Takeaway:

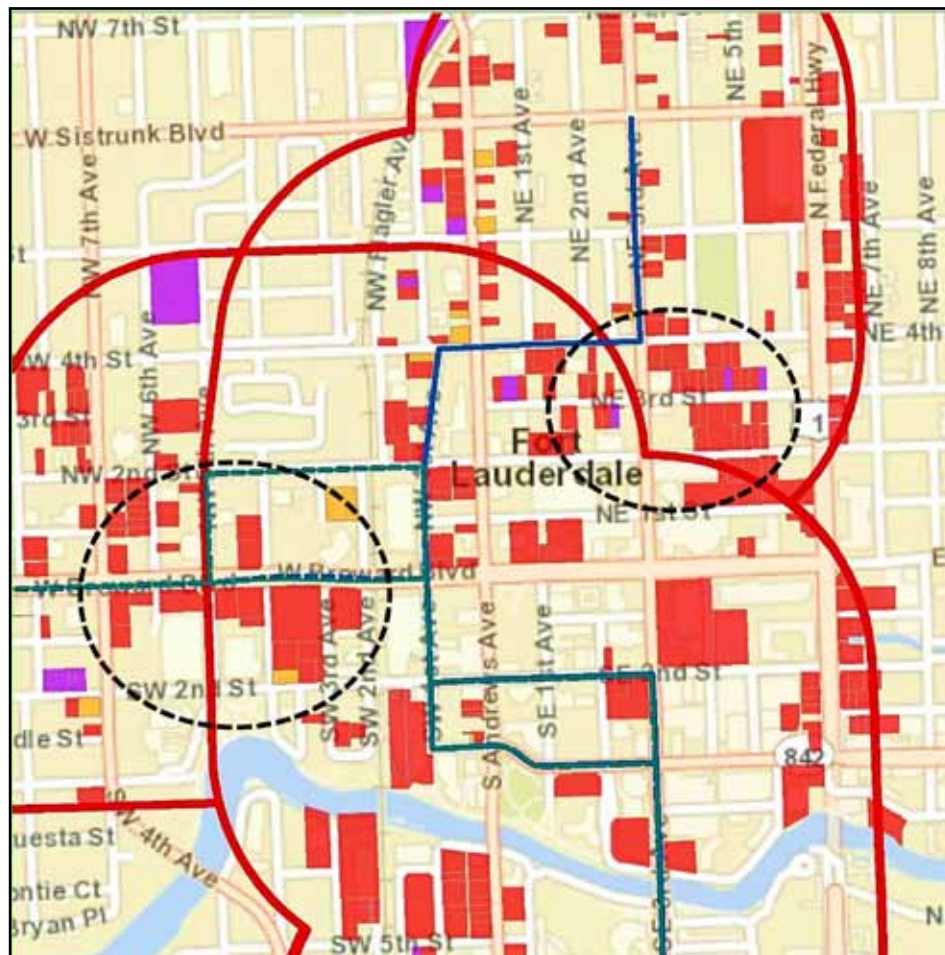
While there are many low ILV parcels in along the Wave Streetcar route in the Fort Lauderdale area, many of these parcels are scattered and, thus, represent more challenging redevelopment options. Clustering does occur, however, in various parts of Fort Lauderdale, as shown in the map below.

- **NE 1st, 2nd, and 3rd Streets**

There are clusters of small low ILV commercial and industrial parcels on NE 1st, 2nd, and 3rd streets between NE 3rd Avenue and N Federal Highway.

- **W Broward Boulevard**

There are also a number of contiguous low ILV commercial parcels along W Broward Boulevard and NW 7th Avenue

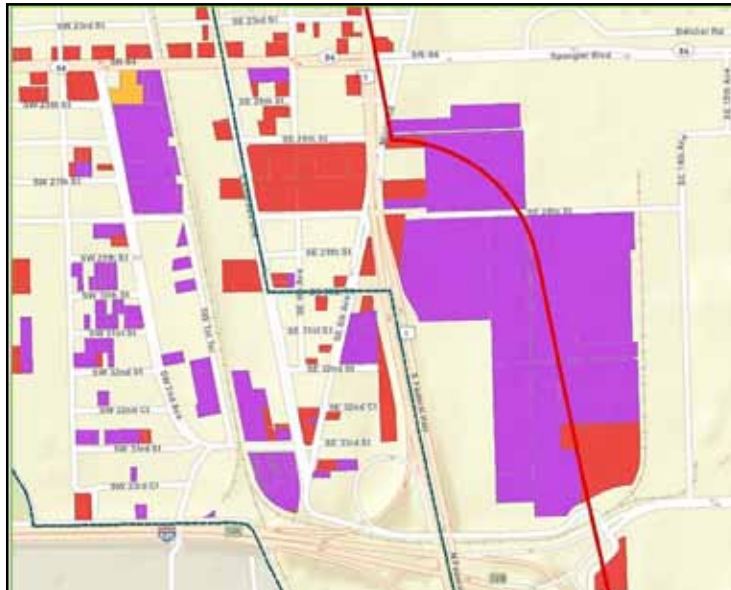


SOURCE: Broward County Property Appraiser; Jacobs Engineering; 4ward Planning Inc., 2014

# Potential Redevelopment Opportunities

## Takeaway:

Underutilized sites provide prospective opportunities for accommodating redevelopment and infill, bringing new and expanded commercial and industrial opportunities to the study area. Large private industry employers (e.g., manufacturers, back-office call centers, distribution warehouse operators) are likely to target areas with concentrations of large contiguous vacant and/or underutilized land. The pictures below are examples of areas that feature concentrations of land parcels with low ILV ratios:



### Northeast of Airport

The area to the immediate northeast of the airport features many parcels with low ILV ratios, some of which are quite large



### East of Florida's Turnpike

There is a concentration of contiguous parcels with low ILV ratios just to the east of Florida's Turnpike

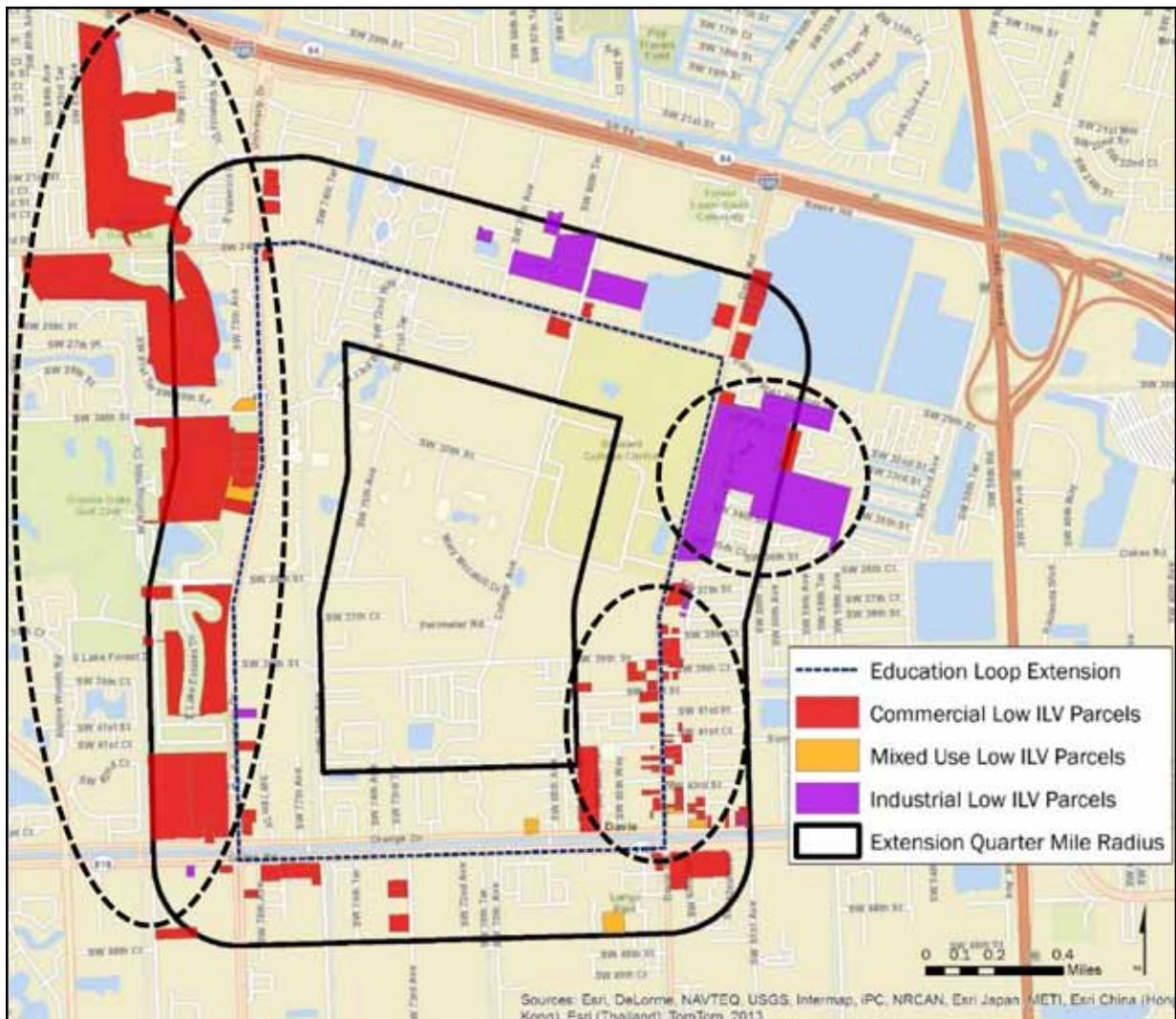
SOURCE: Broward County Property Appraiser; Jacobs Engineering; 4ward Planning Inc., 2014

# Potential Redevelopment Opportunities

## Takeaway:

### South Florida Education Center Loop

Underutilized sites offer accommodation for redevelopment and infill, bringing new commercial and industrial opportunities to the study area and increasing transit ridership. Large private industry employers (e.g., manufacturers, back-office call centers, distribution warehouse operators) are likely to target areas with concentrations of large contiguous vacant and/or underutilized land. The areas highlighted below contain concentrations of land parcels with low ILV ratios.



SOURCE: Broward County Property Appraiser; Jacobs Engineering; 4ward Planning Inc., 2014



# General and Limiting Conditions



4ward Planning Inc. has endeavored to ensure that the reported data and information contained in this report are complete, accurate, and relevant. All estimates, assumptions and extrapolations are based on methodological techniques employed by 4ward Planning Inc. and believed to be reliable. 4ward Planning Inc. assumes no responsibility for inaccuracies in reporting by the client, its agents, representatives, or any other third party data source used in the preparation of this report.

Further, 4ward Planning Inc. makes no warranty or representation concerning the manifestation of the estimated or projected values or results contained in this study. This study may not be used for purposes other than that for which it is prepared or for which prior written consent has first been obtained from 4ward Planning Inc. This study is qualified in its entirety by, and should be considered in light of, the above limitations, conditions, and considerations.

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